DENTSPLY
GENDEX

GX 770™

intra-oral x-ray system

installation/maintenance manual

THIS MANUAL MUST BE RETAINED AT INSTALLATION SITE.

IMPORTANT! . . . X-RAY PROTECTION

X-ray equipment may cause injury if used improperly. The instructions contained in this manual must be read and followed when operating the GX-770. Gendex dealers will be glad to assist you in placing the GX-770 in operation.

The GX-770 provides a high degree of protection from unnecessary X-radiation. However, no practical design can provide complete protection, nor prevent operators from exposing themselves or others to unnecessary radiation.

It is important that you be fully acquainted with applicable government radiation protection regulations. Many provisions of these regulations are based on the recommendations of the National Council on Radiation Protection and Measurements. Recommendations for dental X-ray protection are published in NCRP Report Number 35 available from NCRP Publications, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814.

Personal radiation monitoring and protective devices are available. You are urged to use them to protect against unnecessary X-radiation exposure.

FOREWARD

This direction provides information to assemblers for installation of the GX-770. The installation data includes assembly, check-out, adjustment and certification procedures (Sections 2 through 6).

This direction also provides procedures to be followed for periodic scheduled maintenance (Sections 3 through 6).

Basic service data is also provided to include basic theory, troubleshooting and parts (Sections 9 and 10).

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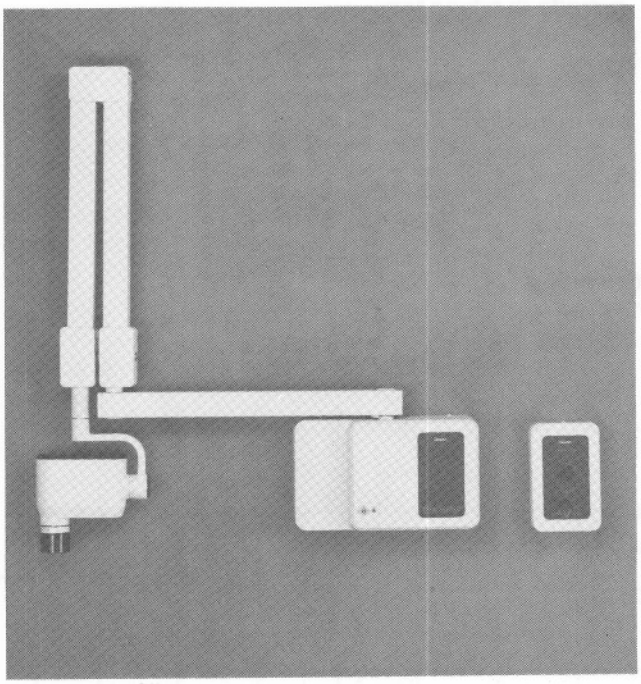
SECTION 1 — PREINSTALLATION

INTRODUCTION

The purpose of this Section is to provide preinstallation information for the GX-770 Intra Oral X-ray System.



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CERTIFIED COMPONENT COMPATIBILITY

The GX-770 System consists of the following certified, compatible components, manufactured by GENDEX.

Component	Model No.	Label Location
Tubehead, 120 V, 60 Hz	46-404650G1	back of tubehead
Tubehead, 120 V, 60 Hz	46-404650G3	back of tubehead
Tubehead, 220 V, 50 Hz	46-404650G4	back of tubehead
Master Control, Canadian 120 V, 60 Hz	46-404600G1, G4, G6	bottom
Master Control, Domestic 120 V, 60 Hz	46-404600G3, G6	bottom
Master Control, International 220 V, 50 Hz	46-404600G2, G5	bottom
8" focal length cone (20 cm)	46-404653G2	around base
12" focal length cone (30 cm)	46-404653G1	around base
Remote Station	46-404725G1, G2	left side

The suspension is Model No. 46-404770G1 and is not required to be certified.

ACCESSORIES

The following are available for optional purchase:

A0771AT	Remote Station Kit
A0772A	4 x 4 Mount
D0773LS	Lighted Remote Switch
D0774A	12 inch cone (30 cm)
D0774B	8 inch cone (20 cm)
A0778AT	Special Length Remote Cable
A8108AA	Remote Switch

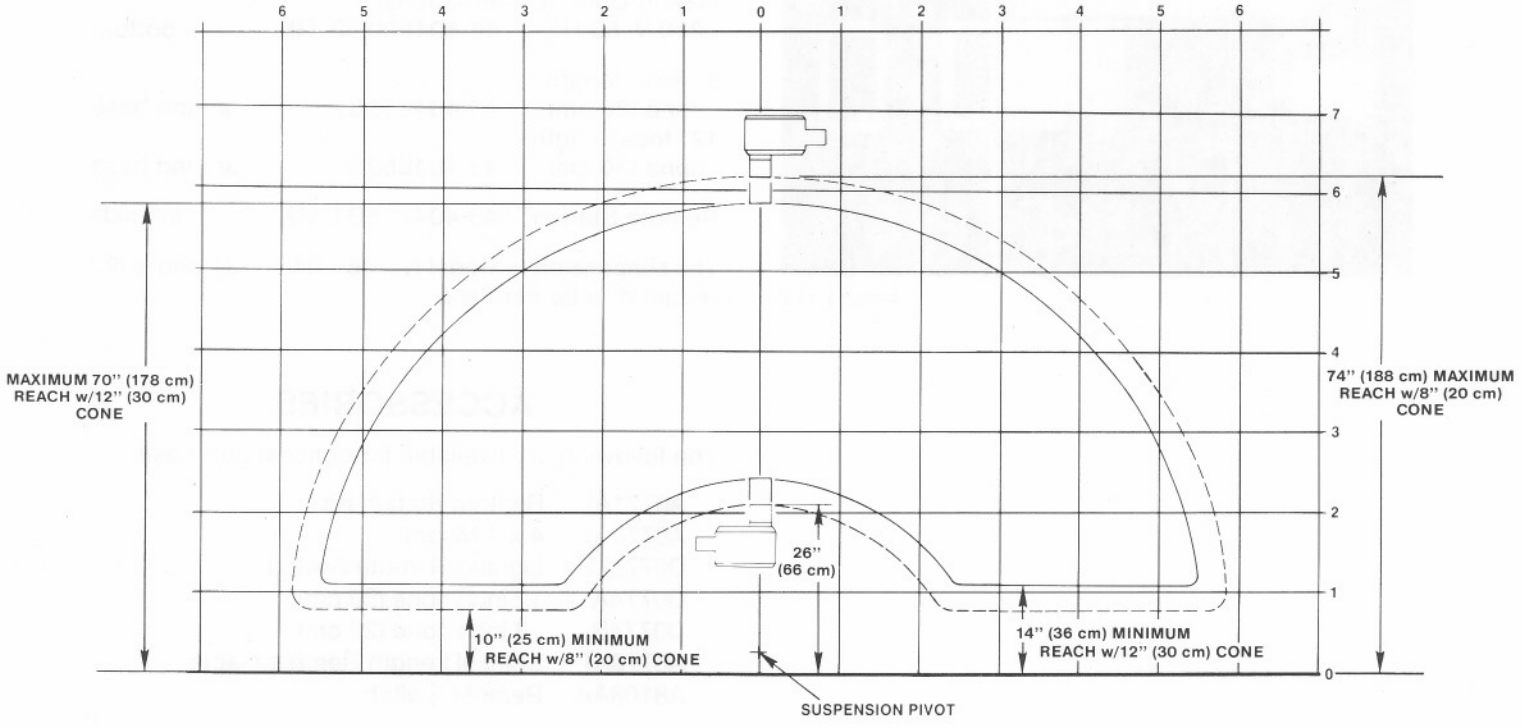
REACH AND COVERAGE

The plan below, Figure 1-1, shows the top view of a typical location with the maximum area of coverage indicated by a dashed line. A patient's head may be located anywhere within this area. The dimensions of this area are reduced by about four in. (10 cm) when a 12 inch (30.5 cm) cone is used, as shown by the solid line. A reference grid, at 1 ft. (30.5 cm) intervals, is shown with respect to the suspension center.

A side view for reach and coverage is shown in Figure 1-2. Dimensions and profiles are shown in Figures 1-3 and 1-4.

The handswitch is attached to the system with a coiled cord. The handswitch can be extended 10 feet (3.05 meters) from the control to allow the operator to reach a position at least 6 ft. (1.83 meters) from the patient. The operator must also be out of the path of the primary beam of the tubehead. Use of a Remote Station or Lighted Remote Exposure Switch can also provide this function.

Reach and Coverage
(Top View)


6 5 4 3 2 1 0 1 2 3 4 5 6
7
6
5
4
3
2
1
0
MAXIMUM 70" (178 cm) REACH w/12" (30 cm) CONE
74" (188 cm) MAXIMUM REACH w/8" (20 cm) CONE
26" (66 cm)
10" (25 cm) MINIMUM REACH w/8" (20 cm) CONE
14" (36 cm) MINIMUM REACH w/12" (30 cm) CONE
SUSPENSION PIVOT

REACH AND COVERAGE ARE THE SAME FOR THE WALL PLATE, 4X4 MOUNTING FIXTURE.

OPTIONAL 18" (46 cm) HORIZONTAL ARM WILL DECREASE REACH BY NINE INCHES (23 CM).

Figure 1-1

Reach and Coverage (Side View)

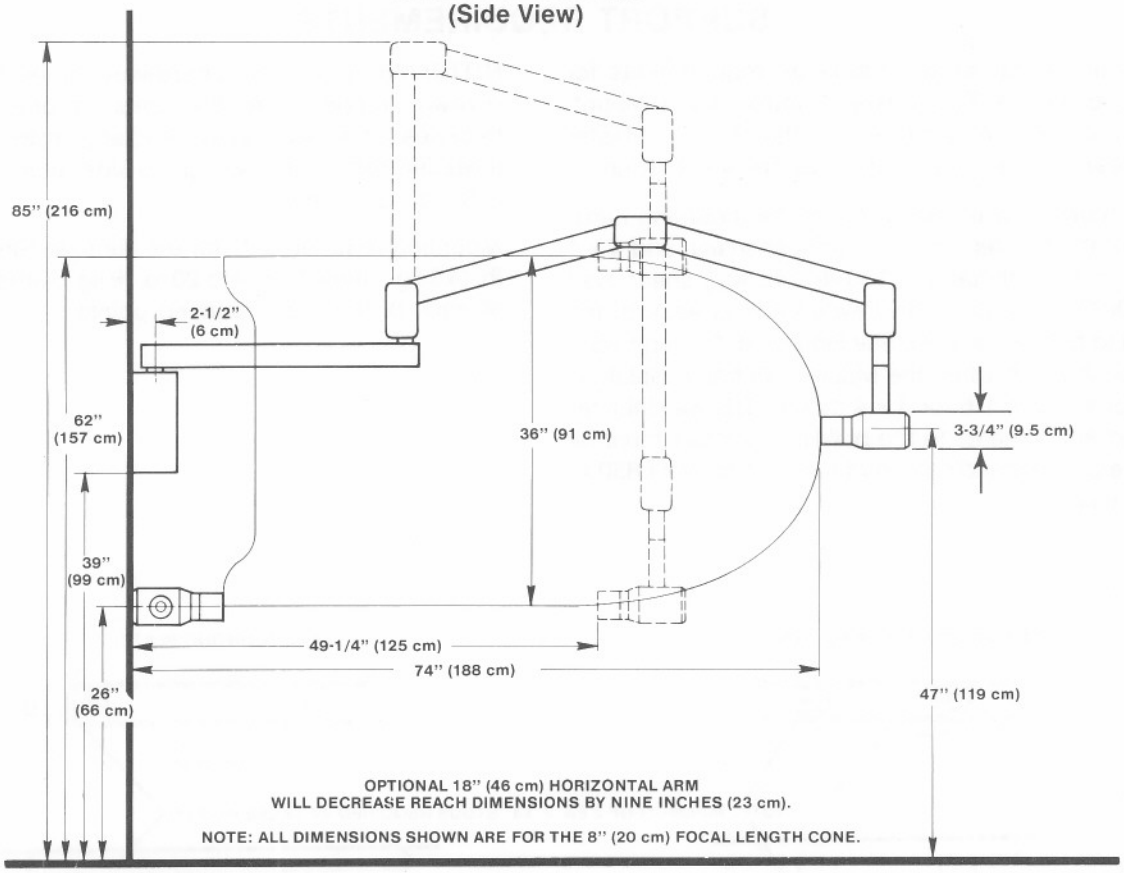
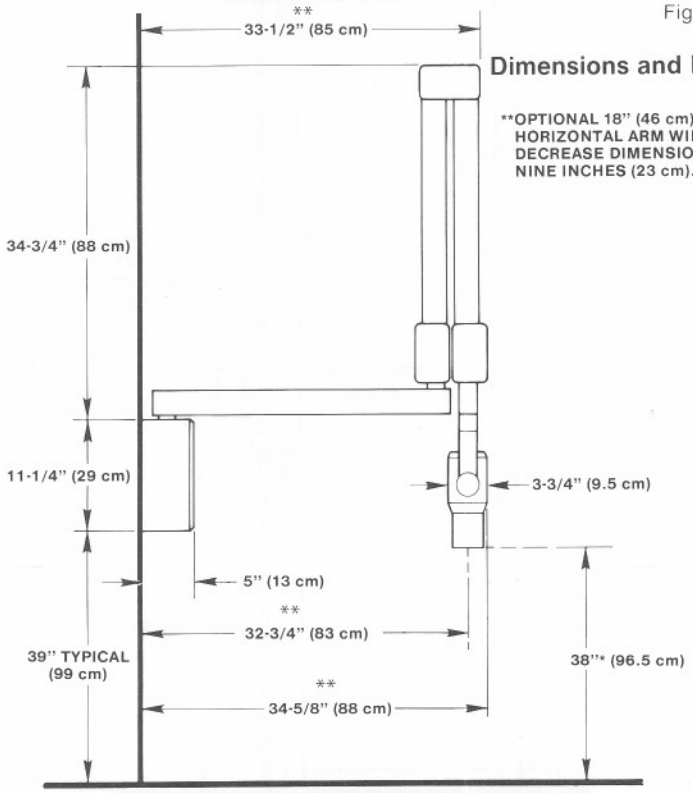

85" (216 cm)
2-1/2" (6 cm)
62" (157 cm)
36" (91 cm)
3-3/4" (9.5 cm)
39" (99 cm)
49-1/4" (125 cm)
74" (188 cm)
26" (66 cm)
47" (119 cm)
OPTIONAL 18" (46 cm) HORIZONTAL ARM WILL DECREASE REACH DIMENSIONS BY NINE INCHES (23 cm).
NOTE: ALL DIMENSIONS SHOWN ARE FOR THE 8" (20 cm) FOCAL LENGTH CONE.

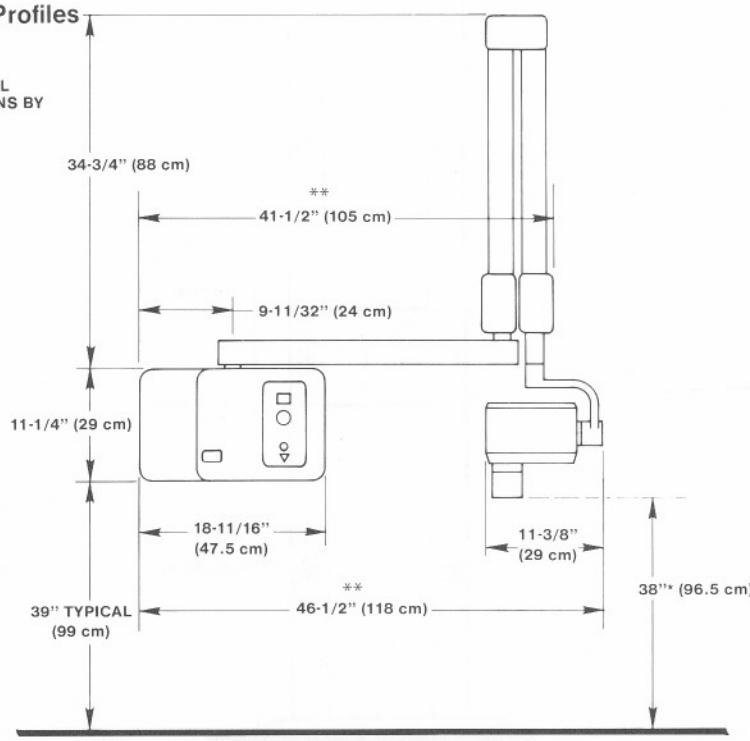
Figure 1-2

Dimensions and Profiles



*DISTANCE WITH 8" (20 cm) FOCAL LENGTH CONE AND UNIT MOUNTED 39" (99 cm) ABOVE FLOOR.

Figure 1-3



*DISTANCE WITH 8" (20 cm) FOCAL LENGTH CONE AND UNIT MOUNTED 39" (99 cm) ABOVE FLOOR.

Figure 1-4

SUPPORT REQUIREMENTS

The basic structural and hardware requirements for mounting the GX-770 Master Control, 4 x 4 Mount. Six lag screws are supplied for the GX-770 Master Control while three are supplied for the 4 x 4 Mount.

For all types of wall construction, the mounting hardware for the Master Control with suspension and 4 x 4 mount must withstand a 100 lb. (45 kg.) shear load and 400 lb. (182 kg.) withdrawal force at each of the mounting bolts or screws. See Figure 1-5 for suggested wall construction when the Master Control Wallplate is used. See Figure 1-6 for 4 x 4 mount. The wall fabrication and attachments to the building structure must be capable of withstanding a load moment force of 850 ft. lbs. (118 kg.m.).

NOTE: When mounting hardware, other than the lag screws shipped with the units, is used, the total thickness of the washer, nut and any protruding bolt or threaded rod on the wall plate side must not exceed 3/8 inch (9.5 mm).

Mounting requirements for the Remote Station are 10 lb. (4.5 kg.) shear load and 20 lb. (9 kg.) withdrawal force at each of the four mounting points.

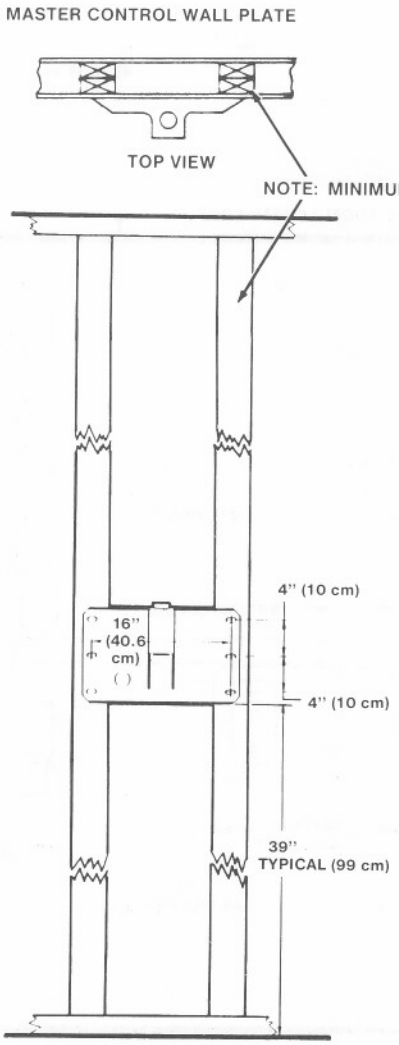

MASTER CONTROL WALL PLATE
TOP VIEW
NOTE: MINIMUM OF 2 EA. 2"X4" STUDS REQUIRED AT THESE POINTS
16" (40.6 cm)
4" (10 cm)
4" (10 cm)
39" TYPICAL (99 cm)

Figure 1-5

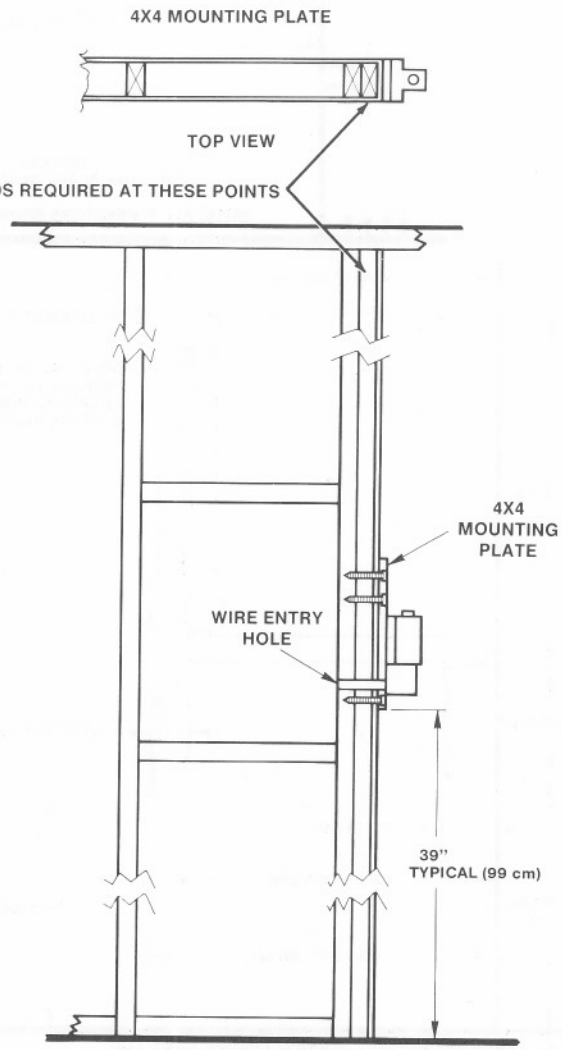


Figure 1-6

ELECTRICAL POWER REQUIREMENTS

Line Voltage range: 110 volts minimum to 130 volts maximum, no load

Maximum line current: 10 amperes during exposure

Maximum line regulation: 3%

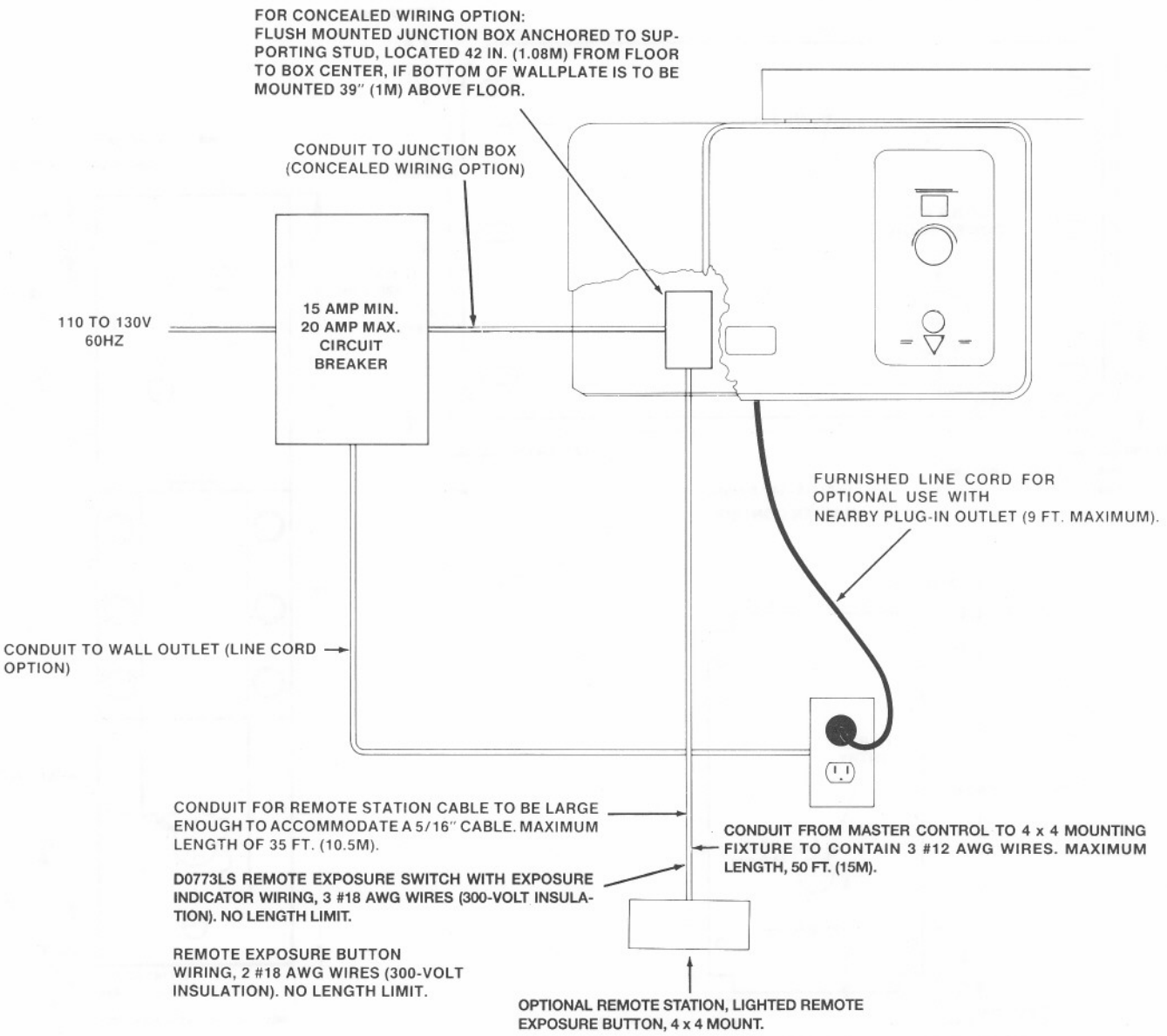
NOTE: For Export Model, refer to the 230 VAC 50 HZ addendum.

Conduit from electrical service distribution center to junction box or wall outlet to contain:
Power "hot" wire, Power wire neutral and ground wire.

#12 wire — up to 100 ft. (30 M)

#10 wire — 100 ft. (30 M) to 150 ft. (46 M)

The circuit should be on a separate fuse or circuit breaker, rated at a minimum of 15 amps, maximum of 20 amps. No other load should be operated on the circuit.


FOR CONCEALED WIRING OPTION:
FLUSH MOUNTED JUNCTION BOX ANCHORED TO SUPPORTING STUD, LOCATED 42 IN. (1.08M) FROM FLOOR TO BOX CENTER, IF BOTTOM OF WALLPLATE IS TO BE MOUNTED 39" (1M) ABOVE FLOOR.
CONDUIT TO JUNCTION BOX (CONCEALED WIRING OPTION)
110 TO 130V 60HZ
15 AMP MIN. 20 AMP MAX. CIRCUIT BREAKER
FURNISHED LINE CORD FOR OPTIONAL USE WITH NEARBY PLUG-IN OUTLET (9 FT. MAXIMUM).
CONDUIT TO WALL OUTLET (LINE CORD OPTION)
CONDUIT FOR REMOTE STATION CABLE TO BE LARGE ENOUGH TO ACCOMMODATE A 5/16" CABLE. MAXIMUM LENGTH OF 35 FT. (10.5M).
CONDUIT FROM MASTER CONTROL TO 4 x 4 MOUNTING FIXTURE TO CONTAIN 3 #12 AWG WIRES. MAXIMUM LENGTH, 50 FT. (15M).
D0773LS REMOTE EXPOSURE SWITCH WITH EXPOSURE INDICATOR WIRING, 3 #18 AWG WIRES (300-VOLT INSULATION). NO LENGTH LIMIT.
REMOTE EXPOSURE BUTTON WIRING, 2 #18 AWG WIRES (300-VOLT INSULATION). NO LENGTH LIMIT.
OPTIONAL REMOTE STATION, LIGHTED REMOTE EXPOSURE BUTTON, 4 x 4 MOUNT.

CERTIFICATION

The certified components of the GX-770 system comply with Radiation Performance Standards 21 CFR, Subchapter J, at time of manufacture.

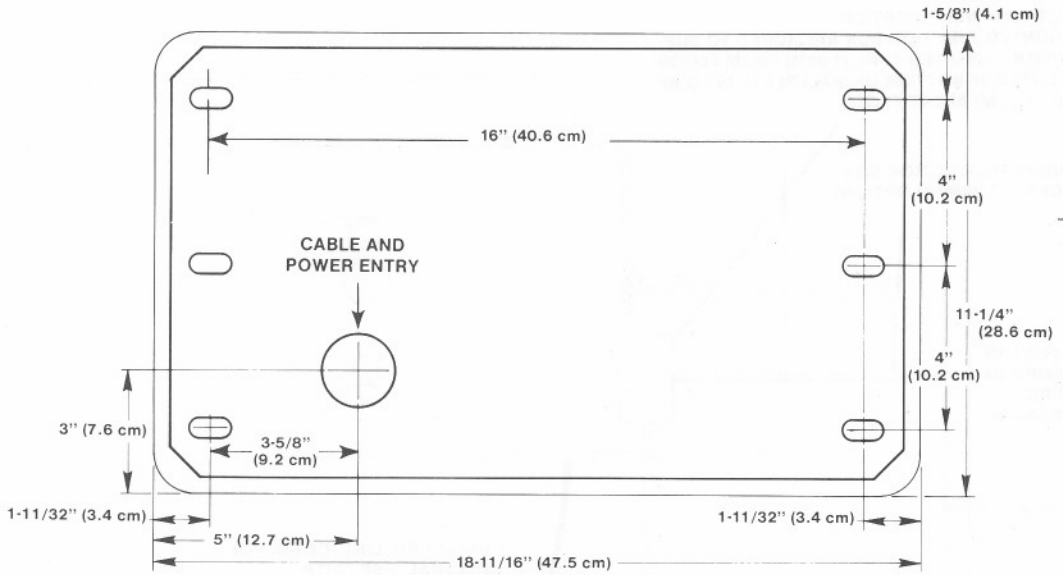
UL and CSA

X-ray equipment classified by Underwriters' Laboratories, Inc., with respect to electrical fire, shock, and mechanical hazard. See U/L Guide ZQ0R, File No. 87724(n).

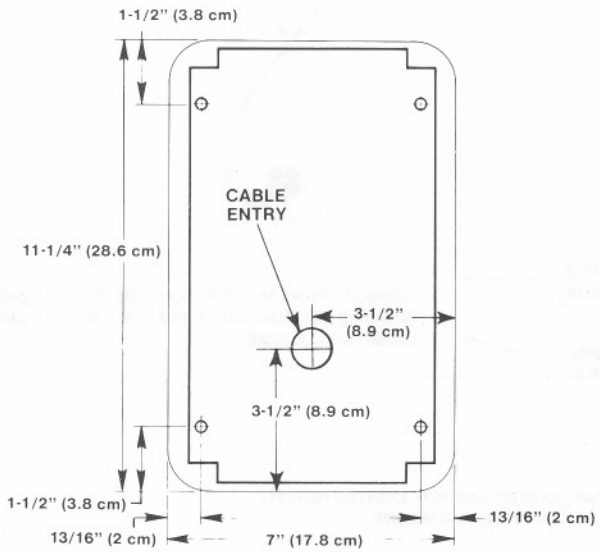
CSA, Class 873101, File LR56282

ENVIRONMENTAL LIMITATIONS

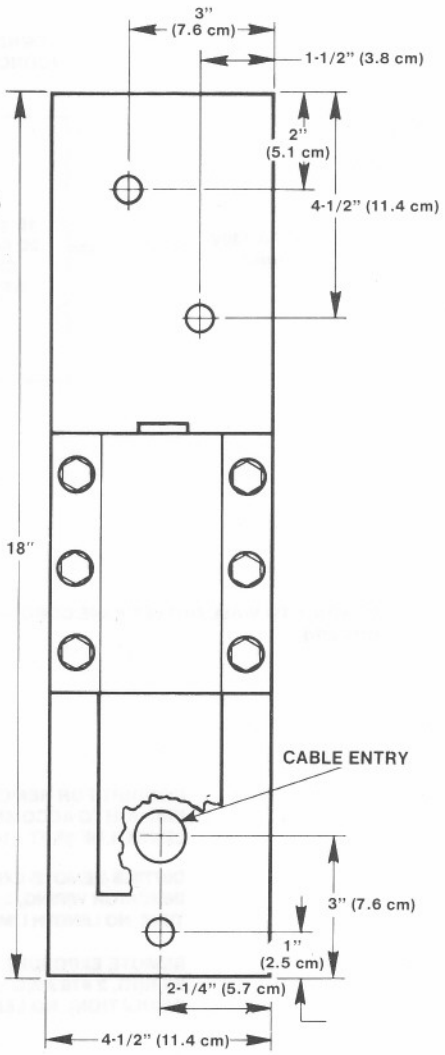
Cooling and duty cycle rating specifications apply at altitudes up to 12,000 feet (3,600 M), average relative humidity not to exceed 95 percent, and maximum ambient temperature not exceeding 80 degrees F (27 degrees C).



MASTER CONTROL



REMOTE STATION



4X4 MOUNTING PLATE

SECTION 2 — INSTALLATION

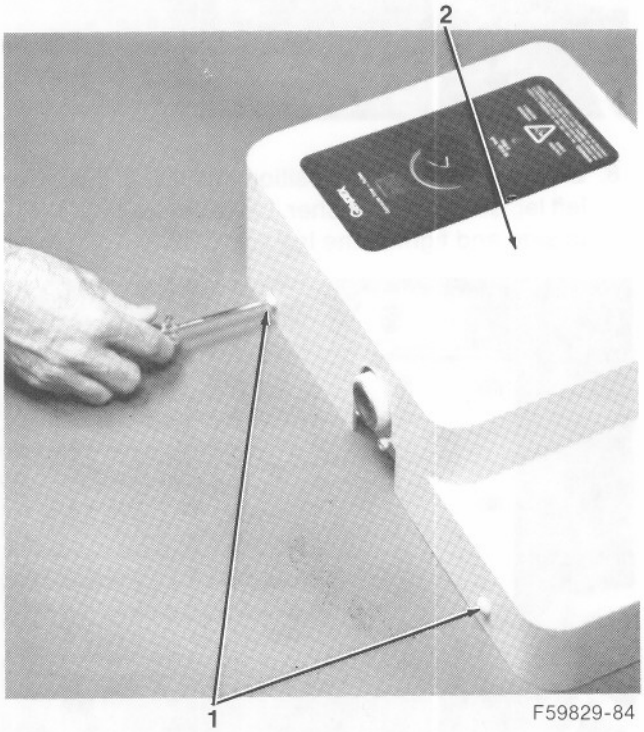
FOREWARD

Prior to beginning the installation, be sure all preinstallation requirements have been completed. This includes confirming that support requirements are adequate for mounting the unit and that the electrical power requirements and entrance locations are proper. Preinstallation requirements for a Remote Station or Remote Exposure Switch should also be complete at this time. If needed, refer to Section 8 for details.

NOTE: If a Remote Station Kit is to be installed, refer to Section 8 or installation instructions shipped with each kit. The GX-770 should be installed and electrical calibration complete **prior** to installation of the Remote Station.

If the installation is to consist of a 4 x 4 mounting fixture, remoted from the wallplate master control, see directions on page 2-11 of this section.

1. Remove the four screws with washers which hold the cover in place, 2 on the top and 2 on the bottom.
2. Lift off the cover and put aside in a safe location.



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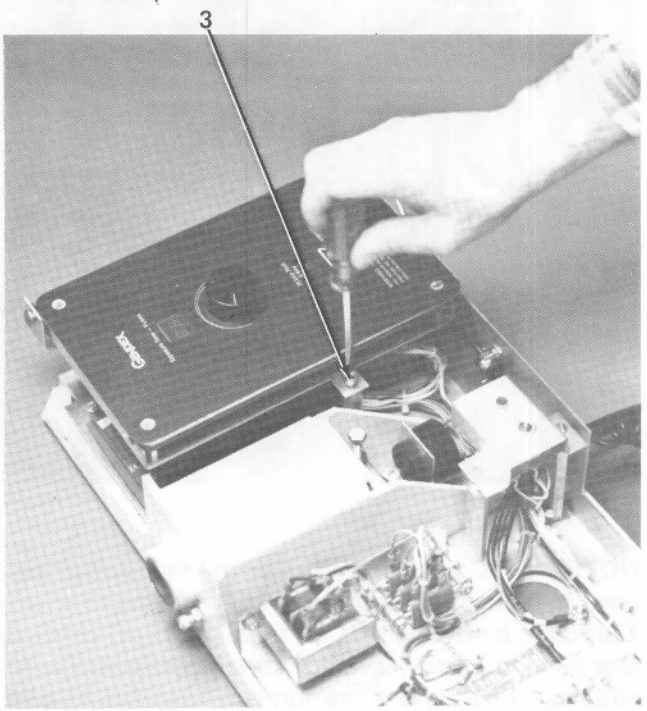
3. Remove the screw located just to the left of the Timer Control board. The Timer Control Board chassis is hinged and can now swing to the right to allow access to the electrical sub-chassis. Remove the four nuts holding the electrical sub-chassis to the wall plate.



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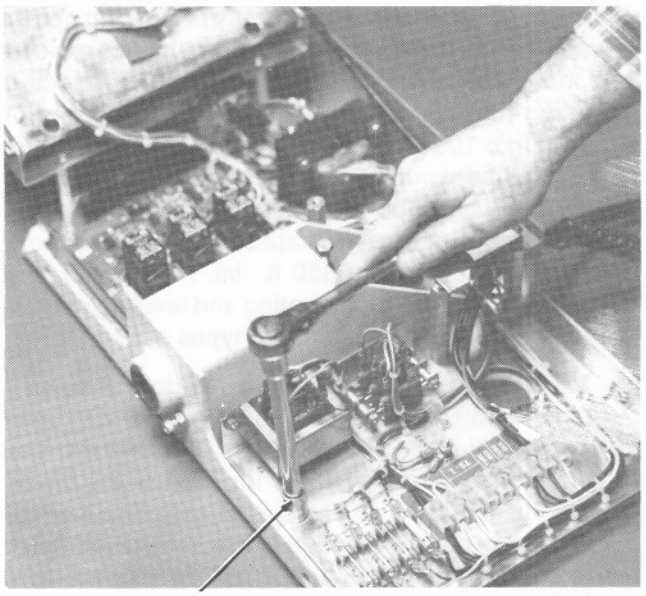

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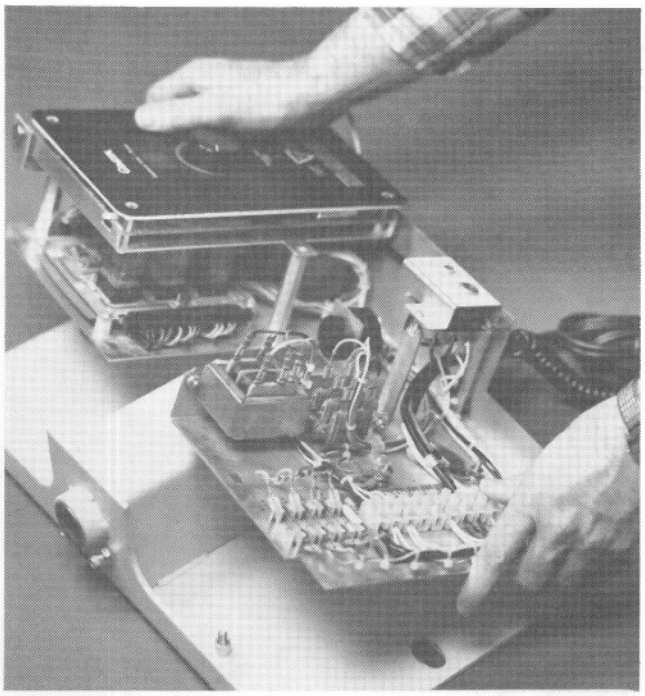
4. Lift off the electrical sub-chassis, being sure to protect the handswitch and power cord. Set aside in a safe location.



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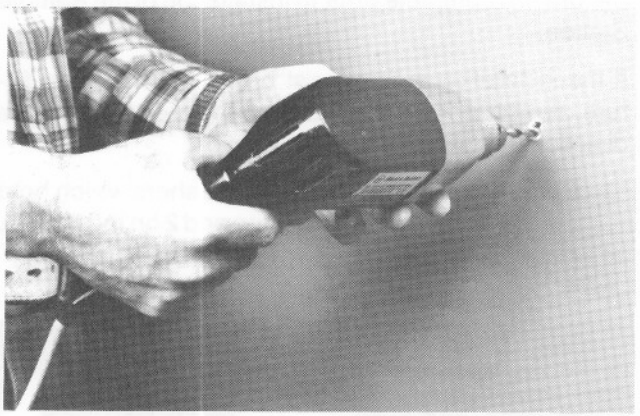
NOTE: Steps 5 through 14 describe the procedures used to fasten the Master Control wallplate to a wall supported by wood studs on 16 in. (40.6 cm.) centers. See Section 1, Preinstallation for suggested wall construction. Lag screws are furnished for this type of mounting. When other hardware is used, the total thickness of the washer, nut and any protruding bolt or threaded rod on the wallplate side must not exceed 3/8 inch. For any wall construction, the selected mounting hardware to be used must be capable of supporting a 100 lb. (45 kg.) shear load and a 400 lb. (182 kg.) withdrawal force at each of the six mounting points. The wall fabrication and attachments to the building structure must be capable of withstanding a load moment couple of 850 ft. lbs. (118 kg.m.) The following procedure for mounting and leveling may be used, where applicable, for other types of hardware.

5. Mark the location for the bottom edge of the wall plate at 39 inches (1 m) above the floor. If the ceiling height is less than 87 in. (221 cm), then the mounting height must be lowered accordingly. The height may also be adjusted to accommodate the user's choice of a high or low base chair. Refer to Reach and Coverage chart on page 1-2 of Preinstallation Section for additional details.

6. Using a 1/16" drill bit, make several test holes to locate the centers of the studs. Verify that an adequate mounting space on 16 inch centers is present. If the power and Remote Station/ Exposure Switch wiring is to be concealed, the junction box, conduit and wiring should be installed at this time. Also verify that the junction box is located in the lower left corner off the wallplate and at the proper height.
7. Drill the hole for the lower left lag screw using a 1/4" drill bit. This hole will normally be 40-11/16" (1.04 m.) above the finished floor, if the bottom of the wallplate is to be 39" (1 m) above the finished floor. However if the mounting height in step 5 was altered, then this height must be modified accordingly.



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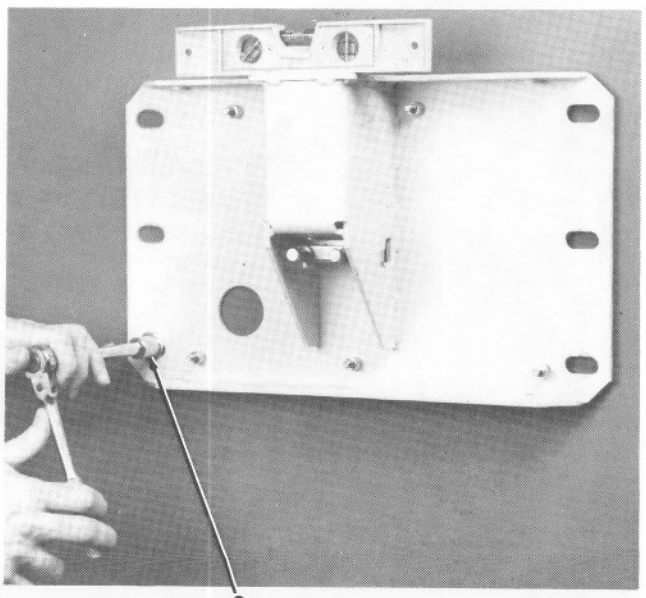
8. Lift the wallplate into position and install the lower left lag screw and washer. Level the wallplate side to side and tighten the lag screw.



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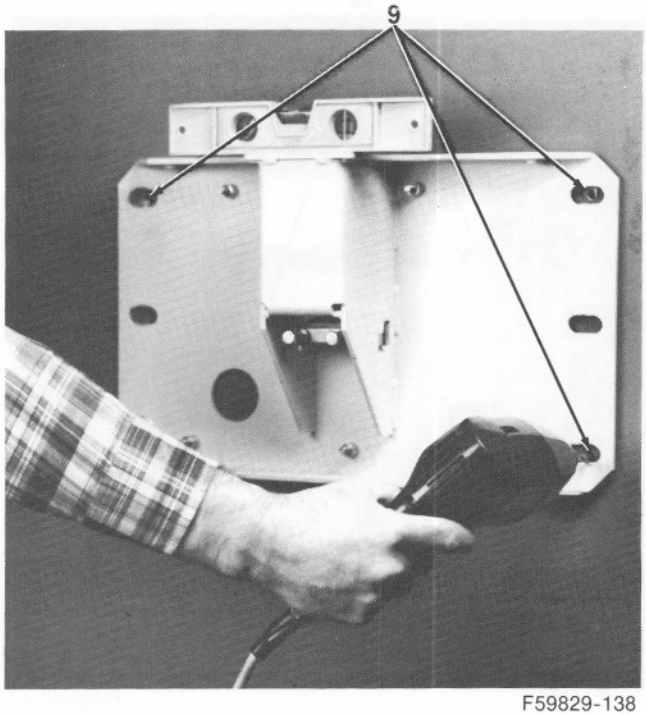
9. Drill holes for the other three corner lag screws using a 1/4 inch drill bit. Be sure that the wallplate remains level side to side.



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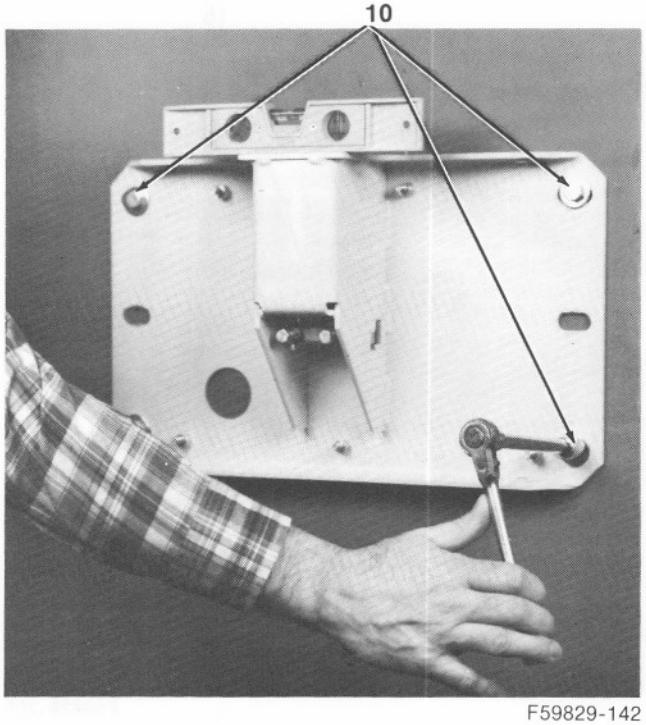
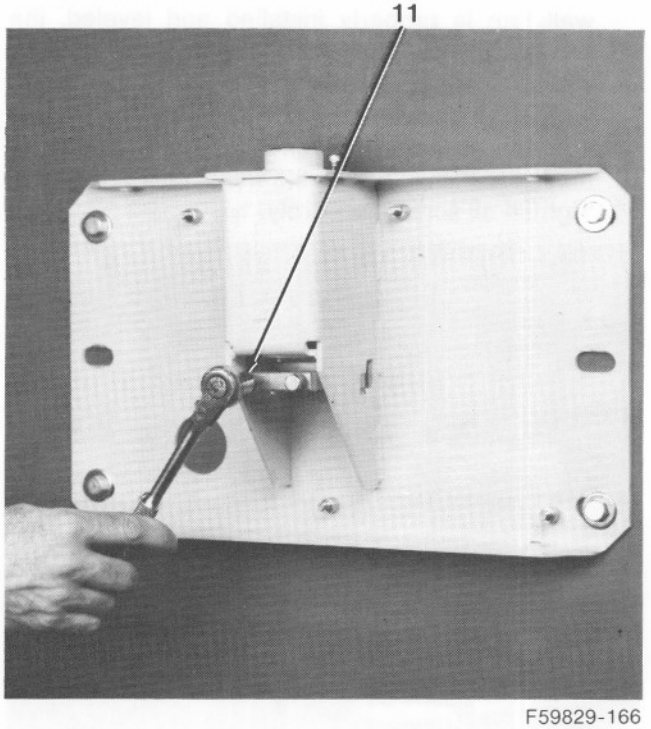
10. Install the remaining three corner lag screws and washers loosely.



F59829-142

11. Remove the horizontal arm brake.



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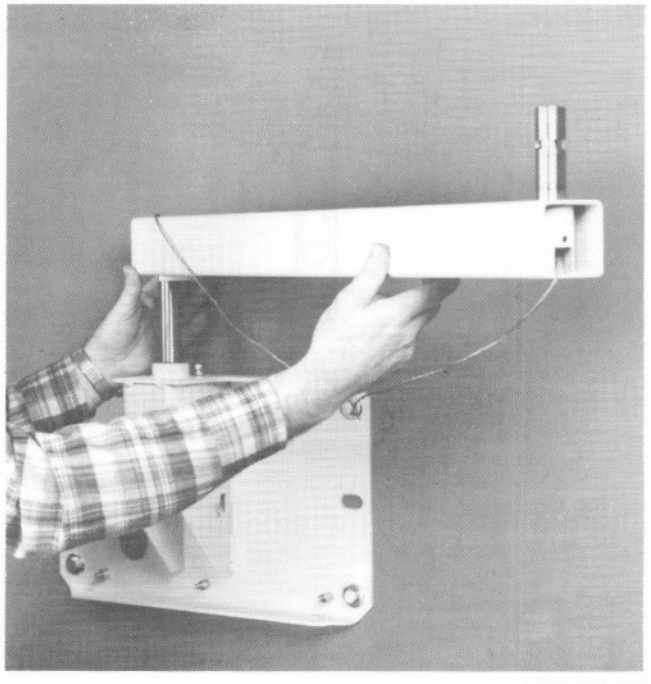
12. Install the horizontal arm with the long pivot post inserted into the wallplate.



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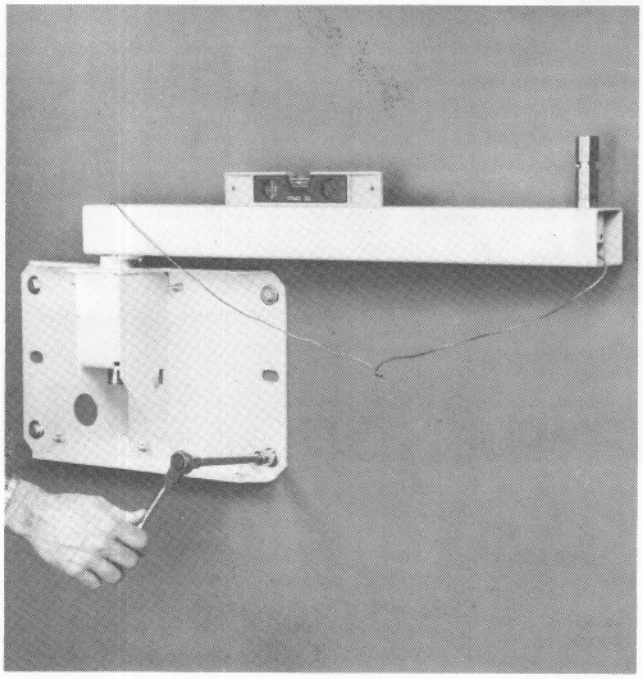
13. Check the level of the horizontal arm. When the wallplate is properly installed and leveled, the horizontal arm should be slightly out of level, wallplate end low, when the arm is parallel to the wall. The level should read the same when the arm is pivoted to the right or left side as well as perpendicular to the wall. Shim the wallplate if necessary. Tighten all screws securely.



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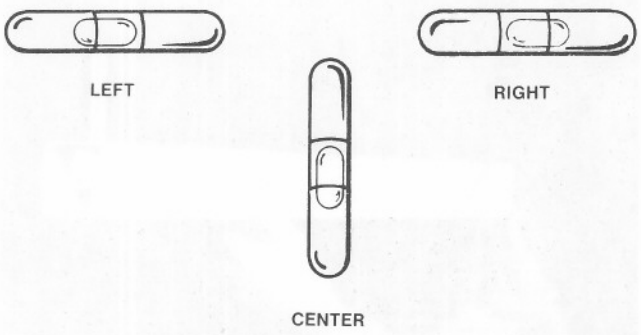
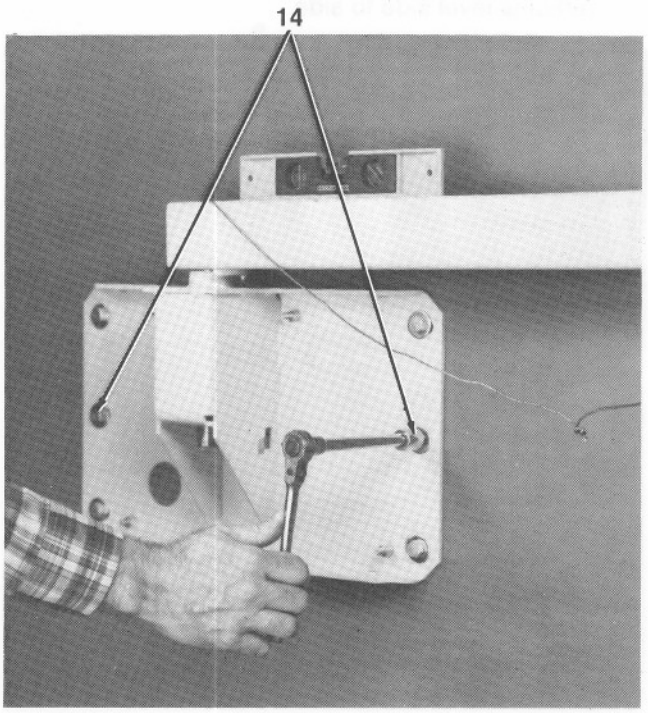


TYPICAL LEVEL INDICATION

14. Drill 1/4 inch holes for and install the remaining lag screws and washers.



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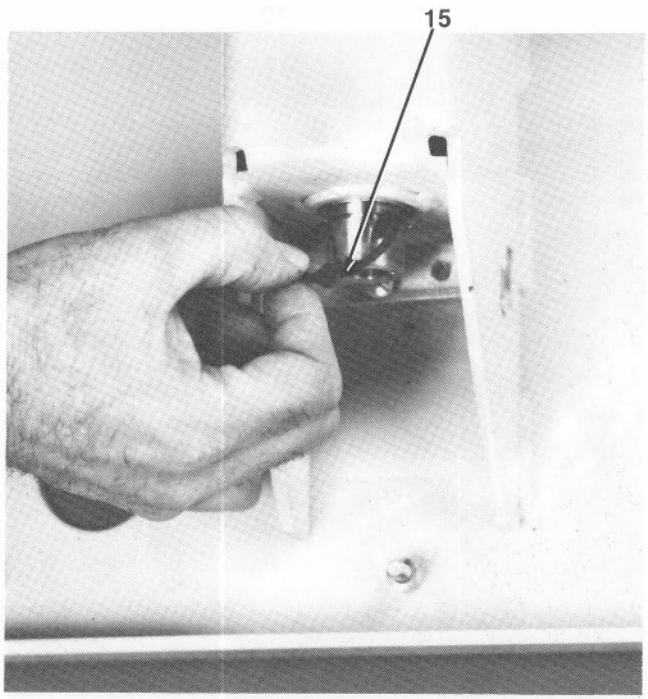
15. Install the retaining clip in the slot at the bottom of the horizontal arm pivot shaft.



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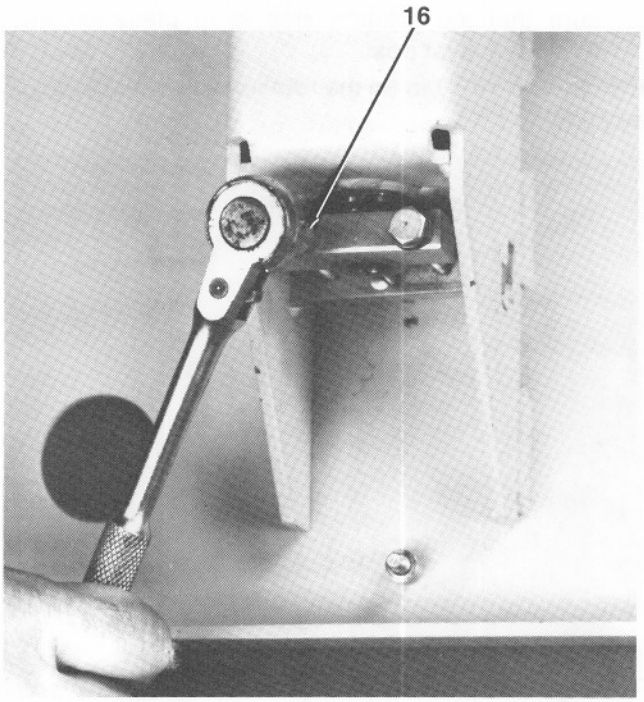
16. Reinstall the horizontal arm brake.



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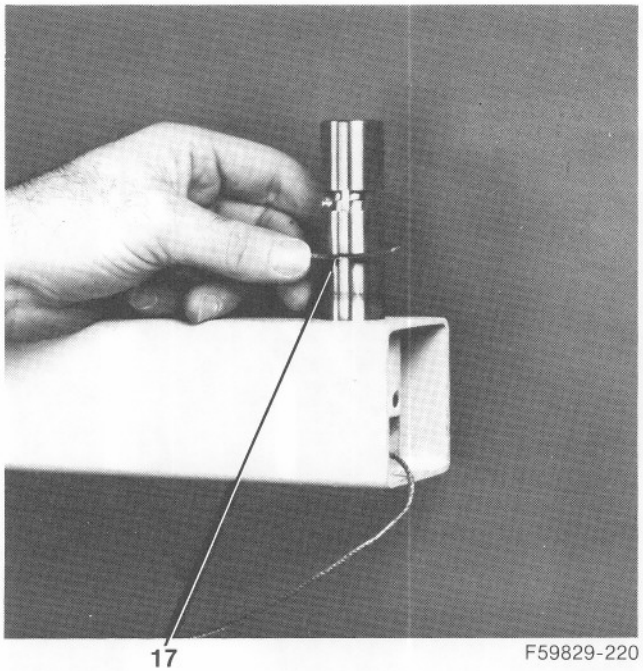
17. Install the thin washer on the horizontal arm pivot on which the suspension arm is to be installed.



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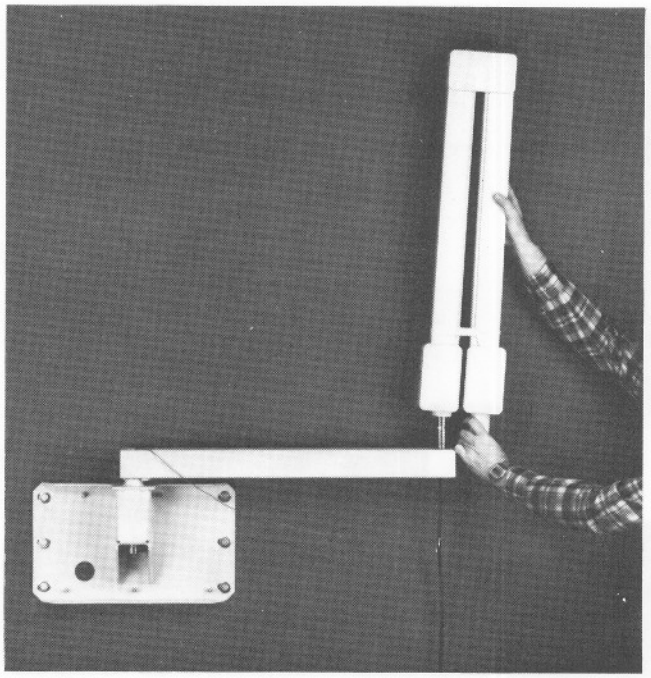
CAUTION

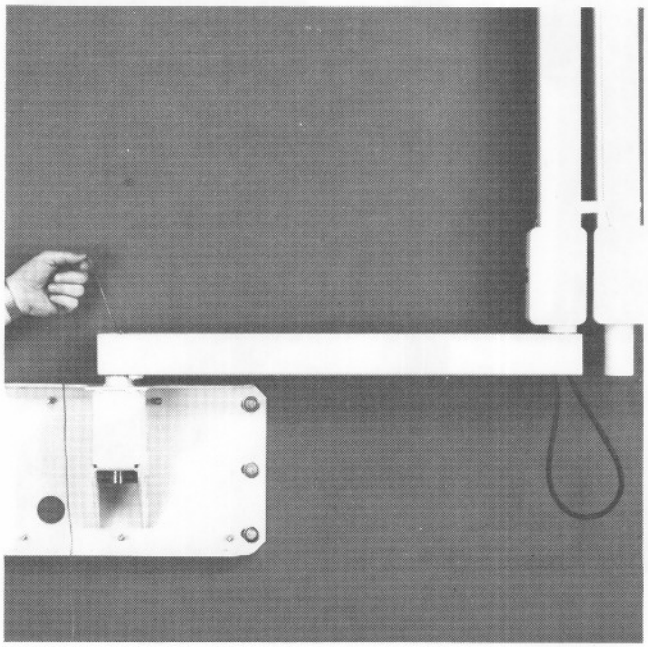
Do not remove tie wrap from the suspension arm until the tubehead has been installed.

18. Install the suspension arm in place on the horizontal arm pivot post. Keep the arm cable tight as it is pulled through the post.



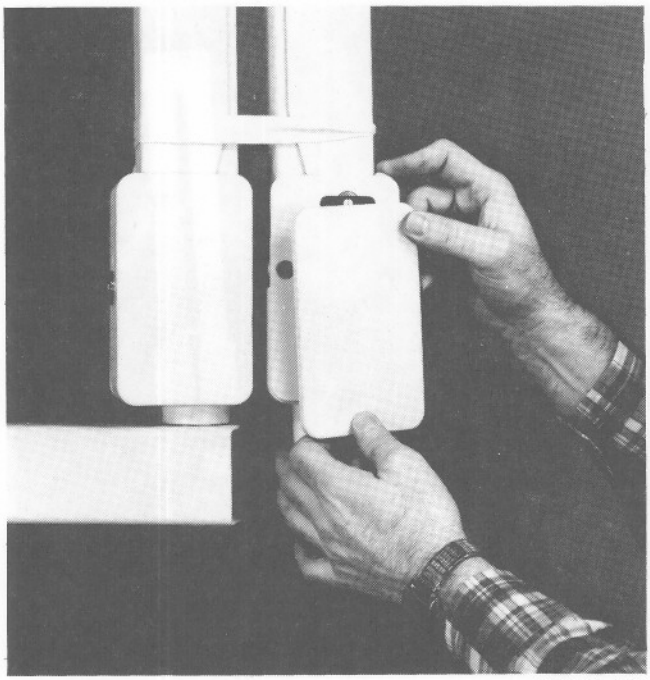
F59829-224

19. Use the string installed in the horizontal arm to pull the suspension cable through the arm and in to the wallplate assembly. Pull the cable through the horizontal arm completely before attempting to route the cable through the pivot post and into the wallplate.



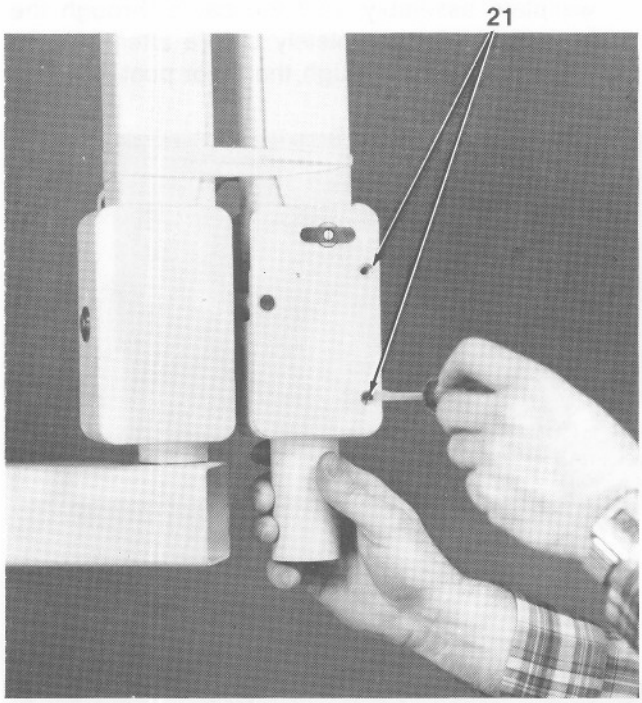
F59829-221

20. Remove the two side trim covers from the sides of the tubehead mounting assembly. The trim covers snap off from the sides.



F59829-229

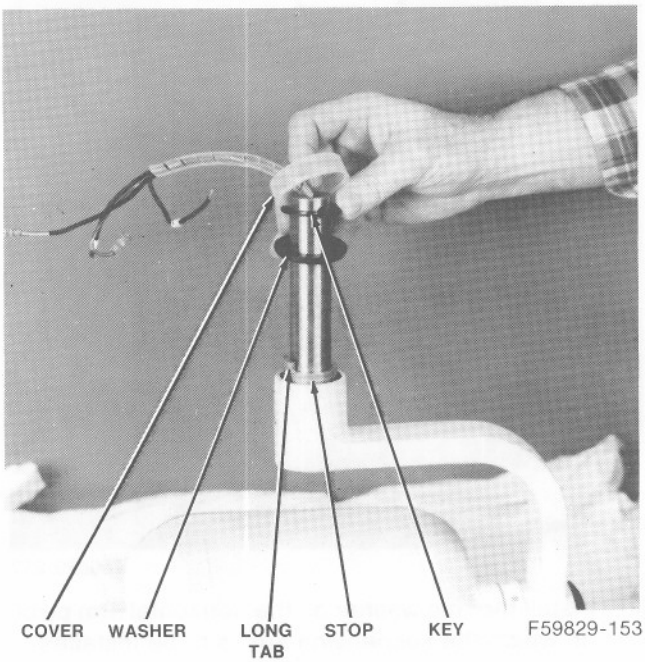
21. Remove tubehead wiring access cover by removing the four flathead screws, 2 on each side.



F59829-156

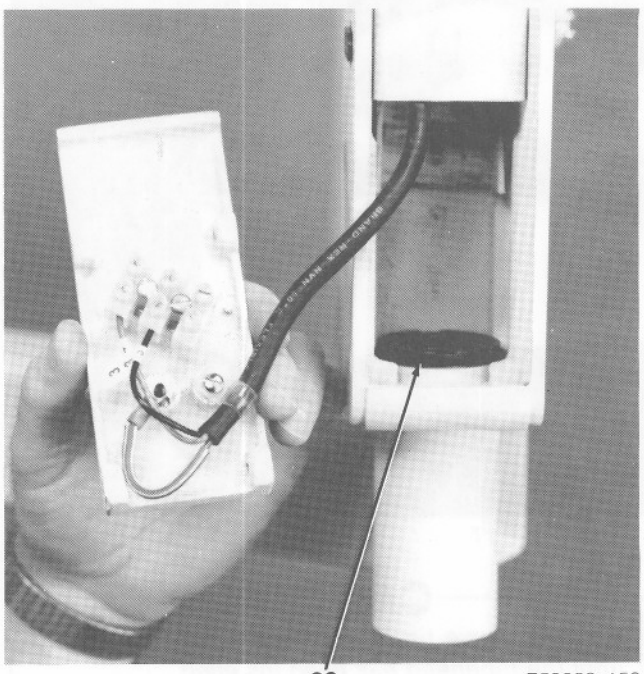
22. Remove the plastic retaining cover, key and keyed washer from the tubehead pivot post. Check to be sure that the rotation stop is in place on the tubehead pivot post.

NOTE: The long tab on the rotation stop must always be pointing up.



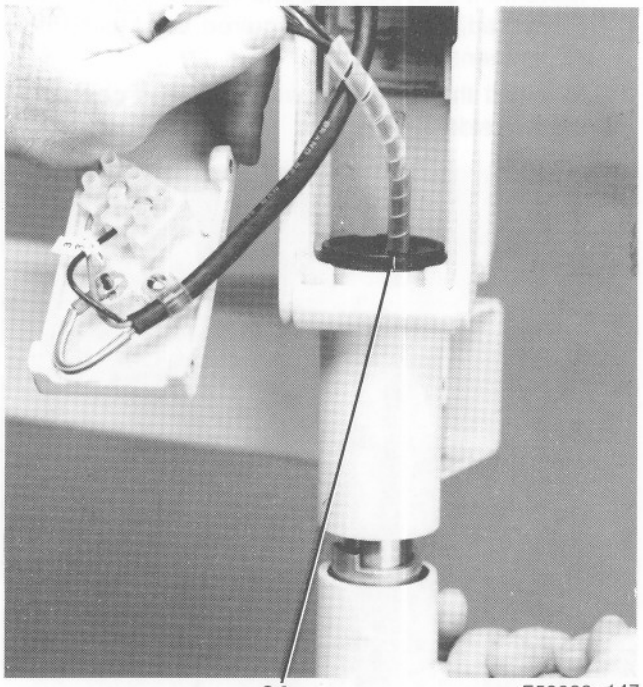
F59829-153

23. Place the keyed washer over the hole in the tubehead mounting assembly through which the tubehead pivot post is to be inserted.



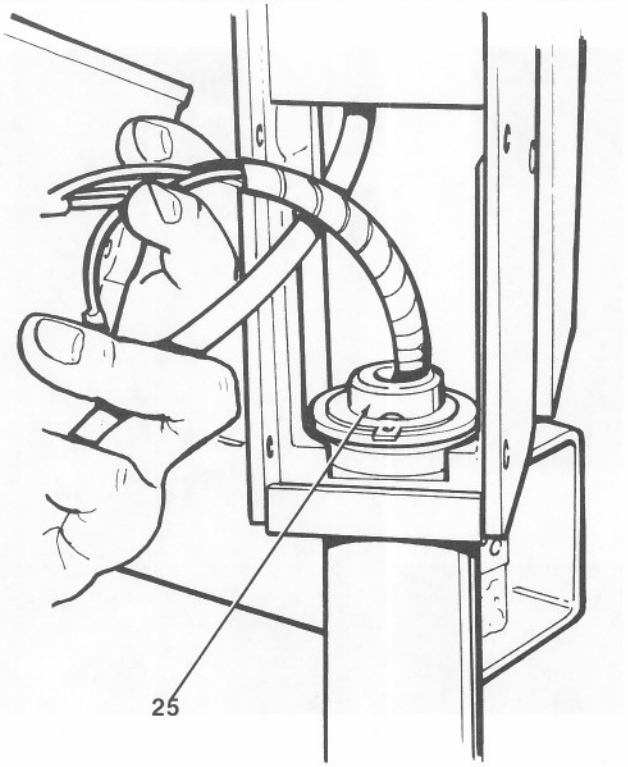
F59829-150

24. Install the tubehead pivot post into the tubehead mounting assembly and through the keyed washer.



F59829-147

25. Install the key on the tubehead pivot shaft. Rotate the tubehead until the key fits into the hole in the pivot shaft and the slots on the keyed washer.

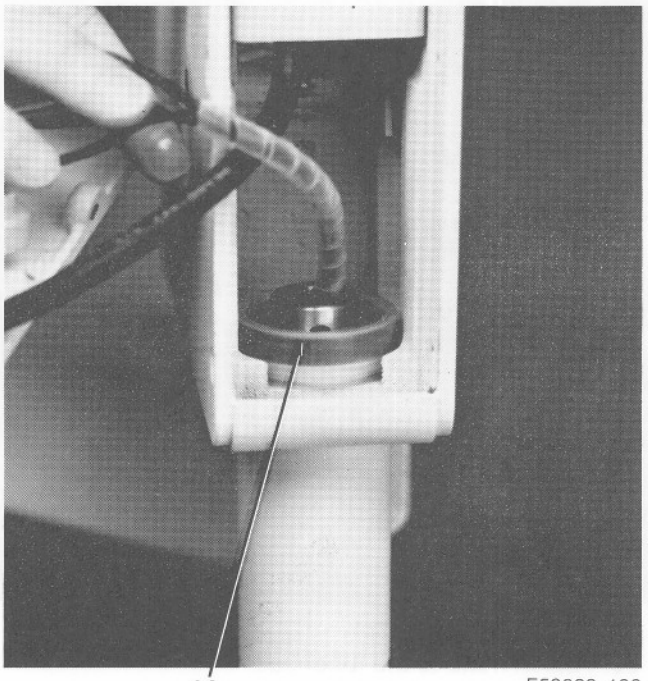


F59829-195

26. Install the plastic retaining cover over the tubehead wires and snap into place over the key and keyed washer.

CAUTION

The plastic retaining cover MUST be installed to prevent the tubehead from falling out during use.

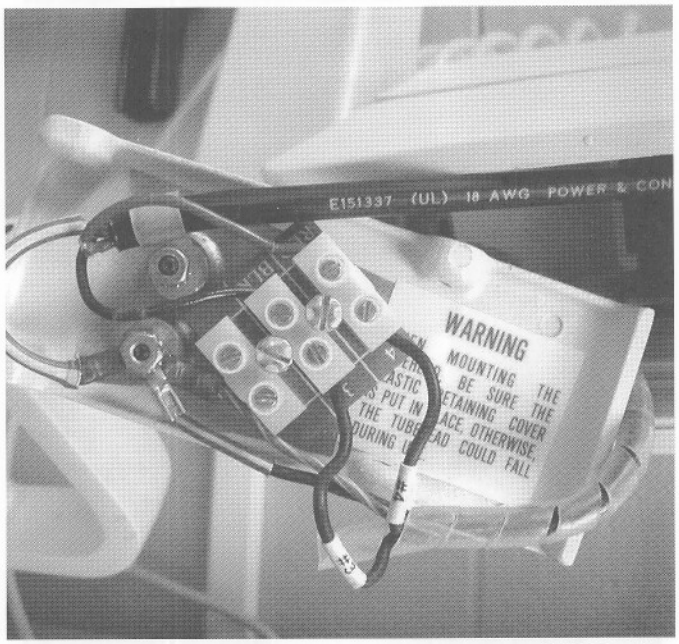


F59829-193

27. Check the tubehead rotation stops by rotating the tubehead through approximately 470 degrees from stop to stop.

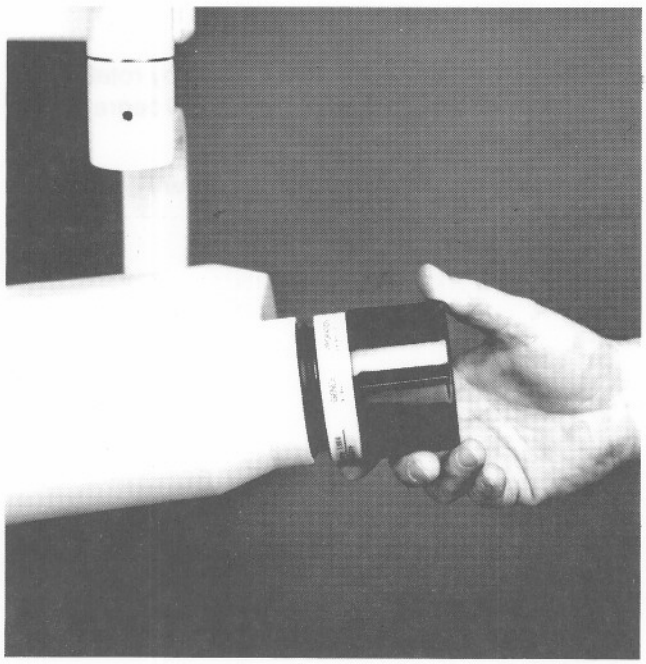
NOTE: Stop MUST be in place to prevent continuous rotation.

28. Connect the four tubehead wires to the terminal strip and ground screw on the tubehead wiring access cover. Wires 3 and 4 connect to wires 3 and 4 on the terminal strip. Both ground wires connect to the ground stud to which the suspension ground wire is already connected.



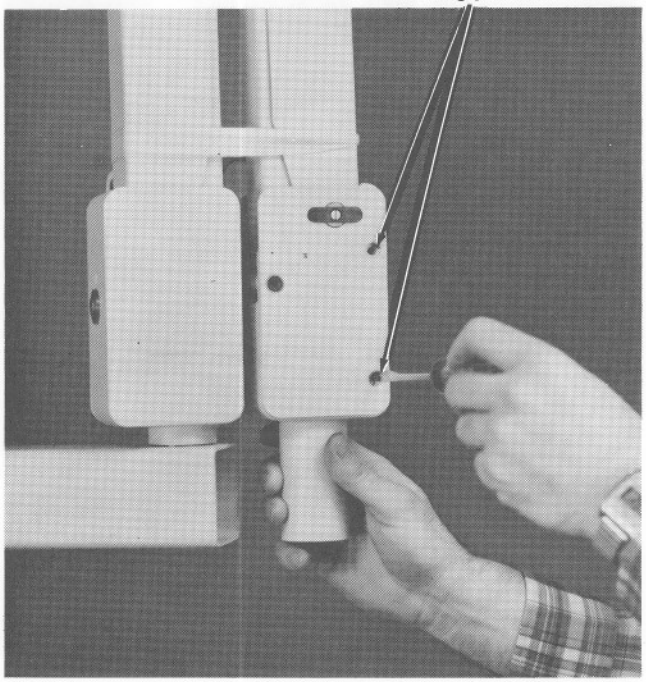
F59829-197

29. Attach cone to the tubehead.

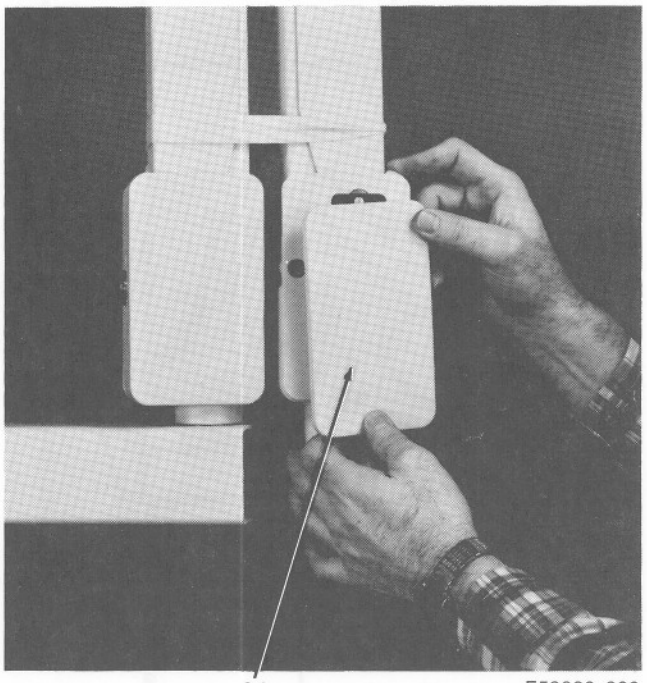


F59829-202

30. Remove the tiewrap from the arm and check the counter balance of the tubehead and for proper movement of the inboard and outboard suspension arms. If adjustments are required, see Mechanical Adjustment Section.
31. Reinstall the tubehead wiring access cover and the two side trim panels.

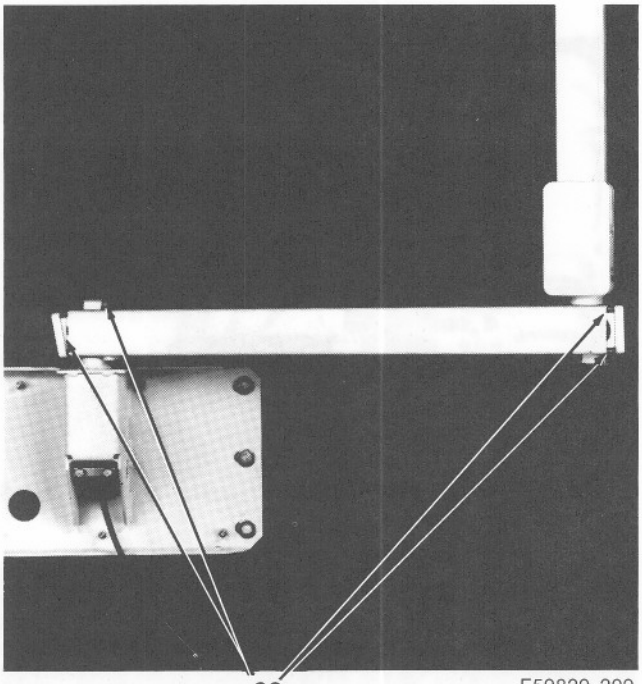


F59829-156



F59829-229

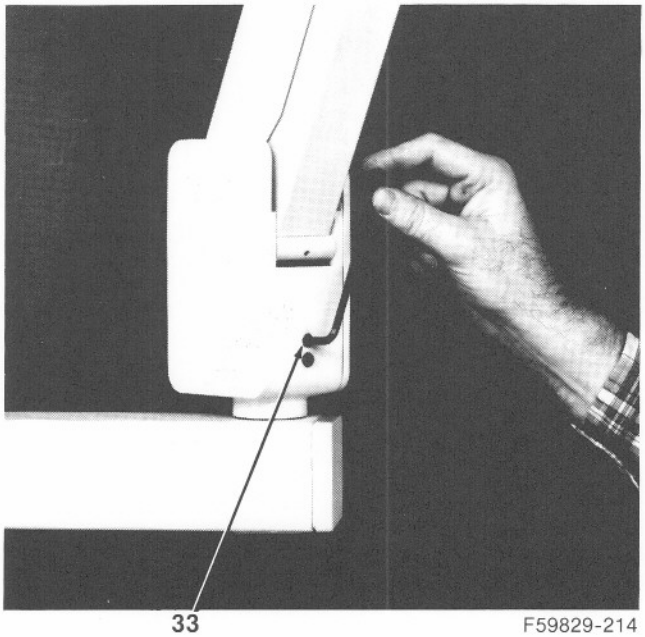
32. Install the two arm end and two pivot post access covers on the horizontal arm.



F59829-209

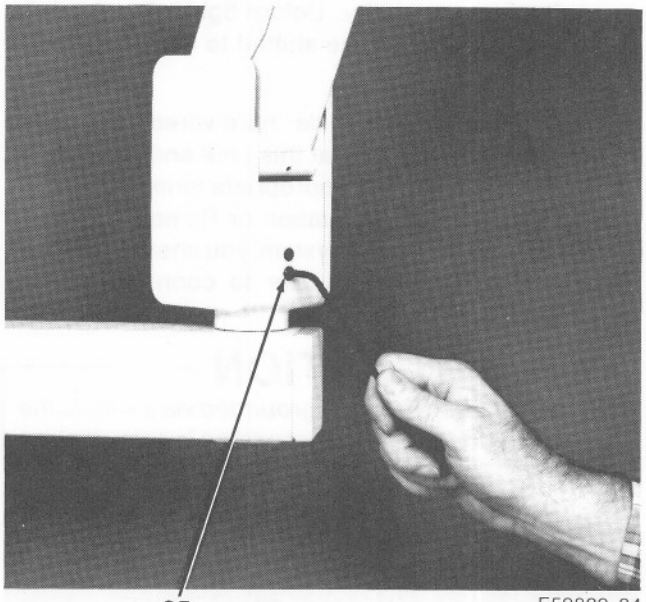
33. Tighten the top set screw, requires a 5/32" allen wrench, located on the lower rear arm casting, then back off 1/2 turn. This screw provides a rotation stop and lift out prevention for the suspension assembly.

NOTE: Refer to Mechanical Adjustment Section for additional calibration information on steps 33, 35 and 36.



F59829-214

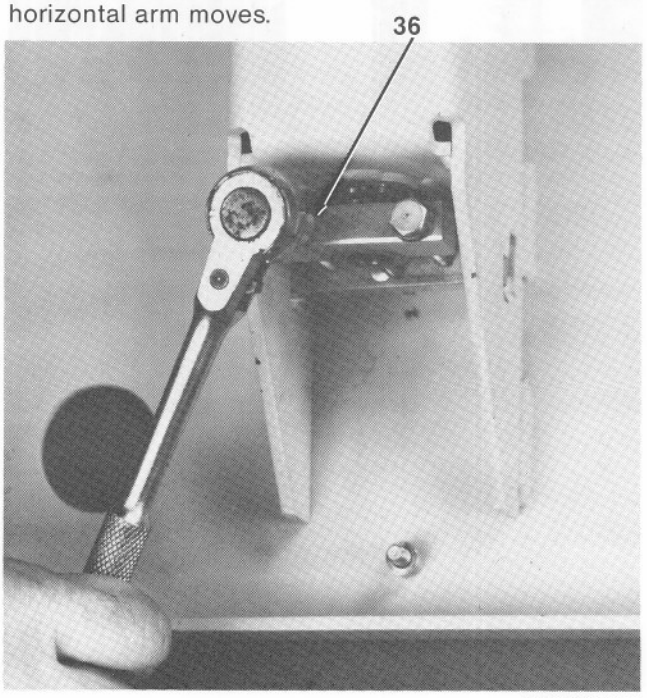
34. Check the suspension arm for rotation from stop to stop of approximately 240 degrees.
35. Tighten the lower set screw, requires 5/32" allen wrench, located on the lower rear arm casting, until it firms up. This screw adjusts the horizontal brake for the pantograph arm.



F59829-34

36. Tighten the horizontal arm brake, requires a 7/16" wrench or socket, as desired.

NOTE: The horizontal arm brake is normally adjusted so that the suspension section opens before the horizontal arm moves.



F59829-212

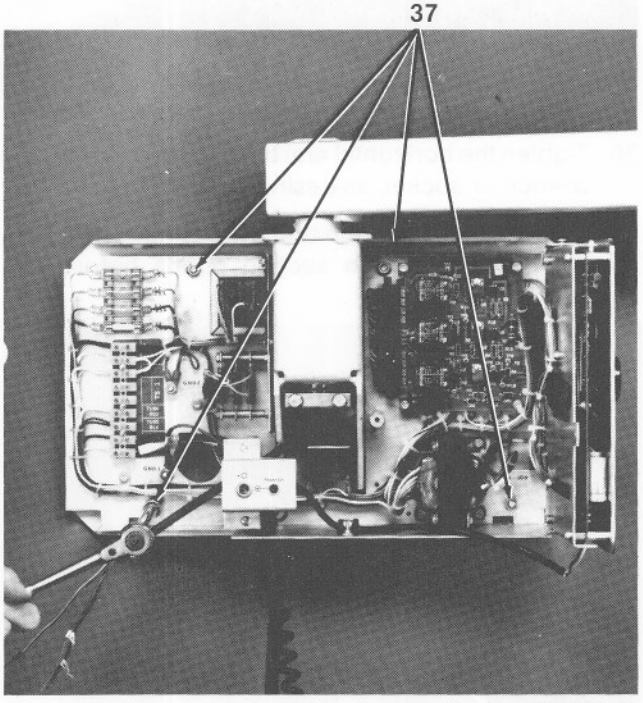
NOTE: If the Master Control is to be installed over a counter where the serial and model number labels would not be visible, they must be removed from the Electrical sub chassis and placed in a location that will be visible after final assembly.

37. Reinstall the electrical sub chassis using the four nuts removed earlier. Before tightening the nuts, the chassis should be shifted to the left as far as possible.

NOTE: If the chassis is to be "hard wired", the power cord should be removed at this time and the conduit wiring connected to the appropriate terminals on TS1 and GND1. If a Remote Station or Remote Exposure Switch is to be part of the system, you should complete the electrical calibration prior to connecting these components.

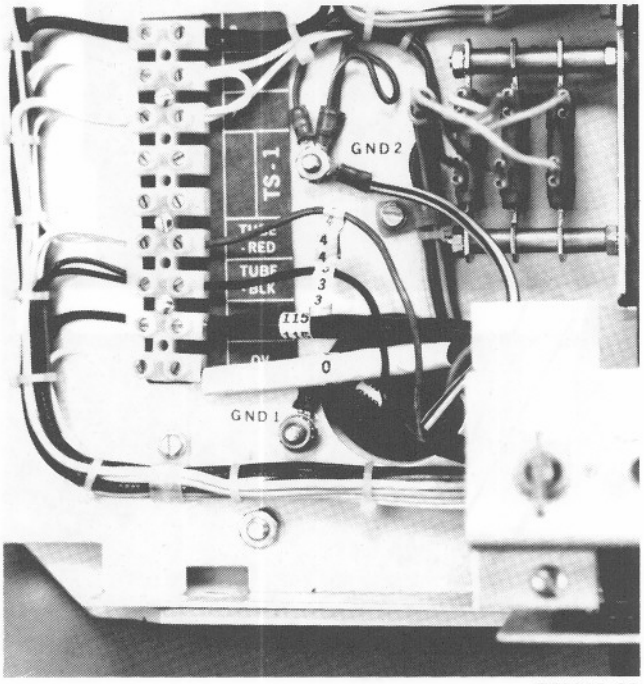
CAUTION

The unit must be properly grounded via a wire to the building ground. Conduit grounding is not sufficient.



F59829-29

38. Connect the suspension arm cable to the appropriate terminals on TS1 and GND2.



F59829-37

The unit is now capable of producing X-rays. Proceed to Sections 3, 4, 5, and 6 for electrical calibration, system function checks, certification and final assembly.

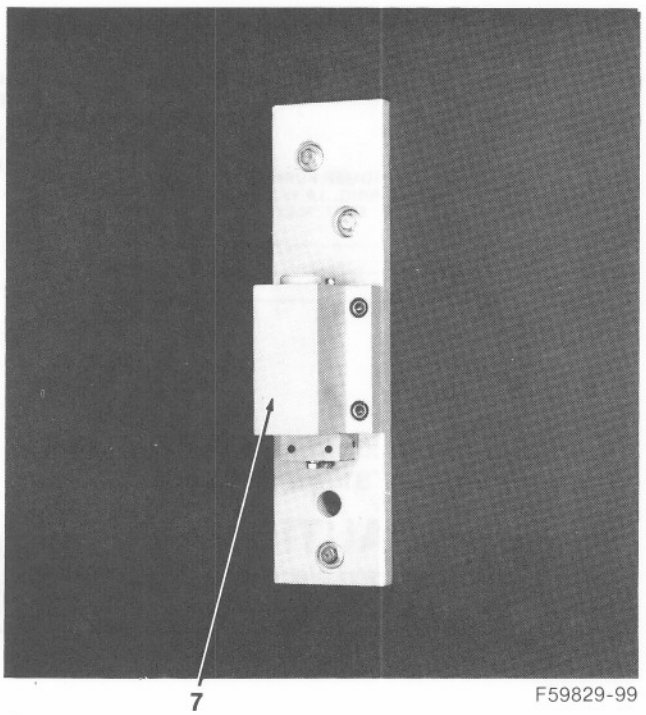
INSTALLATION DIRECTIONS FOR SYSTEM WITH 4 x 4 MOUNTING FIXTURE

The following steps of the installation procedure which begin on page 2-1 of this section along with the modifications noted are applicable for installation of a 4 x 4 Mounting Fixture, remoted from the wallplate master control.

1. Steps 1 through 4 remain the same.

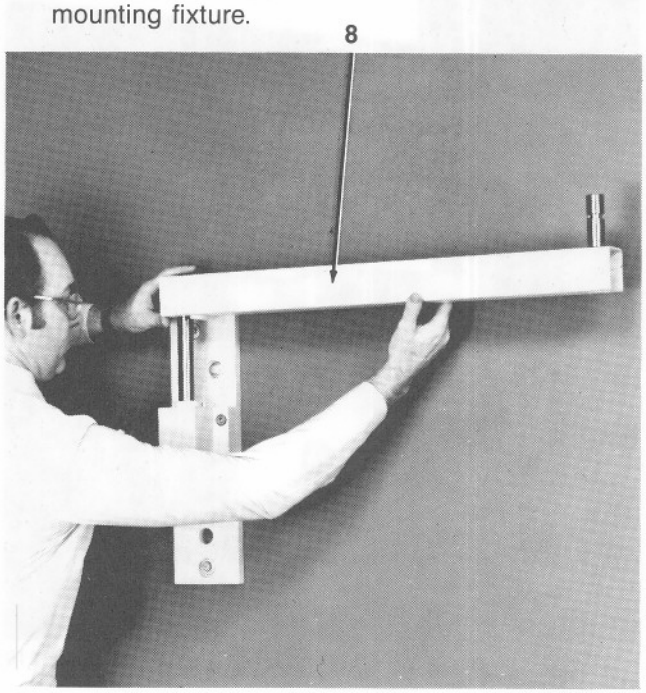
NOTE: Mounting requirements for the Master Control WITHOUT the suspension are: 30 lb. (13.6 kg.) shear load and 90 lb. (40.9 kg.) withdrawal force at each of the four mounting points.

2. Step 5 - Height may be modified to suit preference.
3. Steps 6 through 9 remain the same.
4. Step 10 - Install the remaining 3 corner lag screws loosely. Level the wall plate. Tighten all lag screws securely.
5. Step 11 - Remove the horizontal arm brake from the wallplate. Set aside for reinstallation.
6. Remove the wiring access cover from the 4 x 4 mounting fixture.
7. Install the 4 x 4 mounting fixture using the appropriate mounting hardware. See Preinstallation Section for mounting requirements.



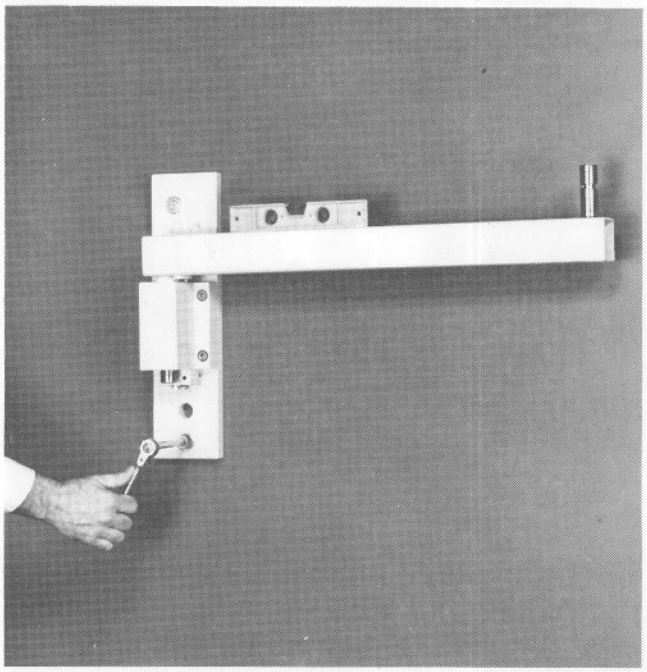
F59829-99

8. Step 12 - Install the horizontal arm or optional short arm with the long pivot post inserted into the 4X4 mounting fixture.



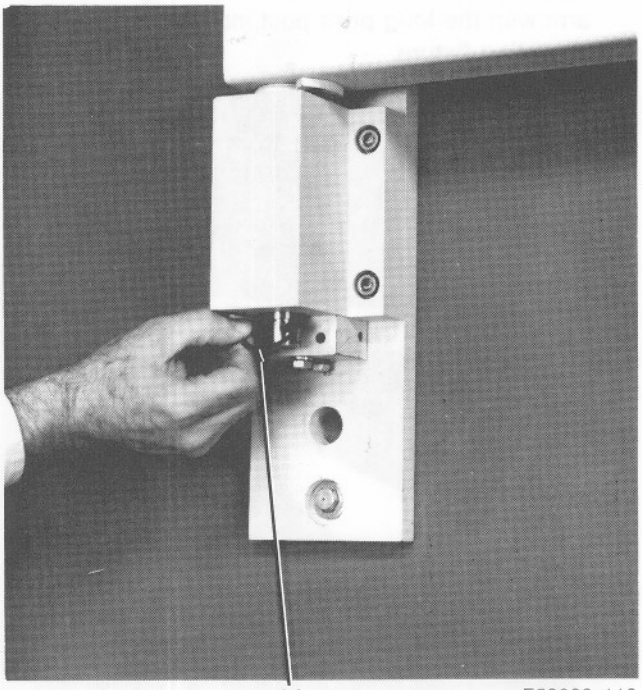
F59829-104

9. Step 13 - Correct the position of the 4 x 4 mounting fixture to achieve the level as described in Step 13, Page 2-4.



F59829-107

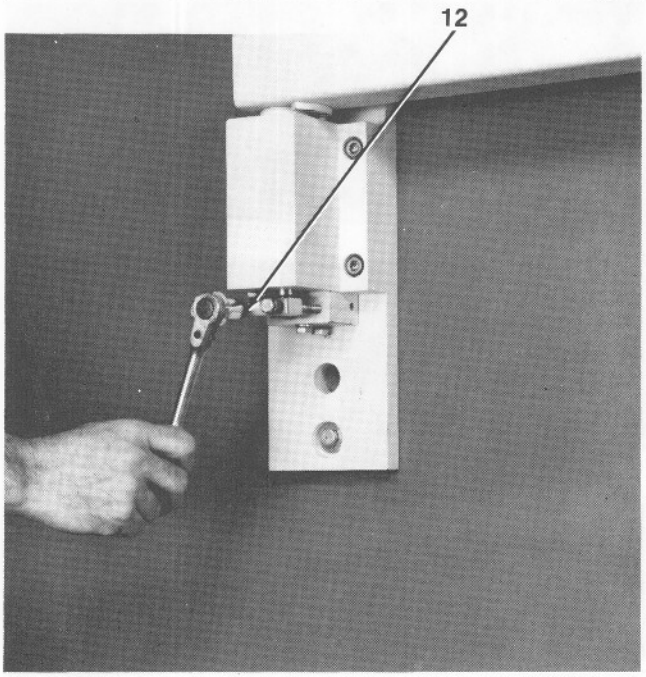
10. Omit Step 14.
11. Install the retaining clip in the slot at the bottom of the horizontal arm pivot shaft.



F59829-110

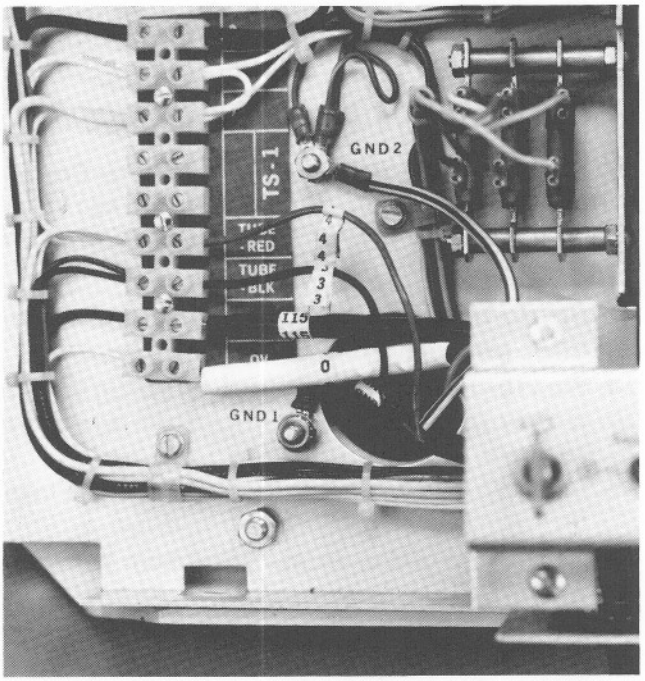
12. Step 16 - Install the horizontal arm brake onto the 4X4 mounting fixture.

NOTE: Use brake removed from the master control wallplate.

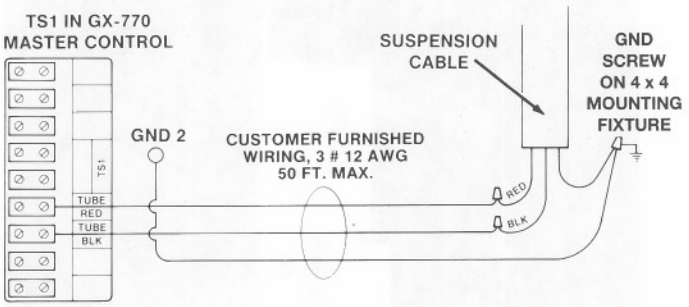


F59829-109

13. Steps 17 through 37 remain the same.
14. Connect the suspension cable to the interconnecting wires and ground screw on the 4 x 4 mounting fixture.



F59829-37

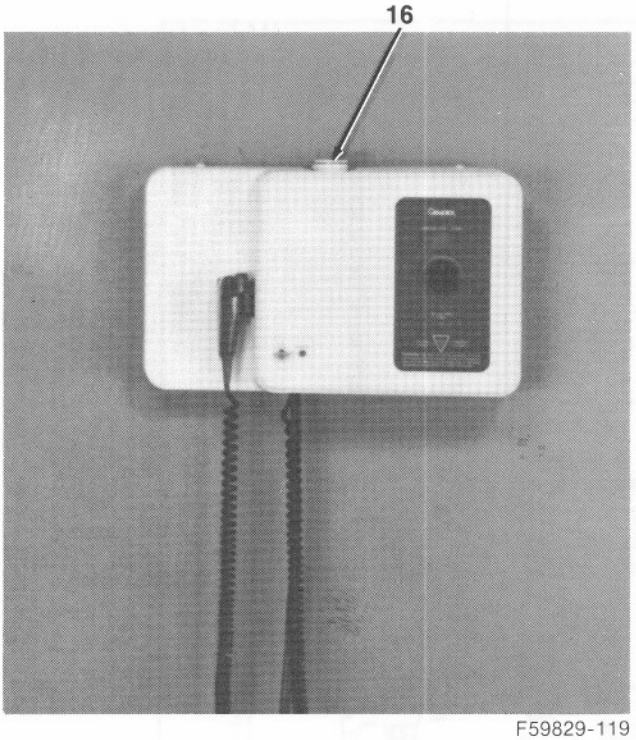


15. Connect the interconnecting wires to the appropriate terminals on TS1 and GND2.

CAUTION

Do not reverse red and black wires in the suspension cable.

16. Install the plug button in place on the wallplate pivot hole.



F59829-119

17. Install the three plug buttons to cover the mounting bolts on the 4X4 mount.
18. Reinstall the 4 x 4 mounting fixture wiring access cover.

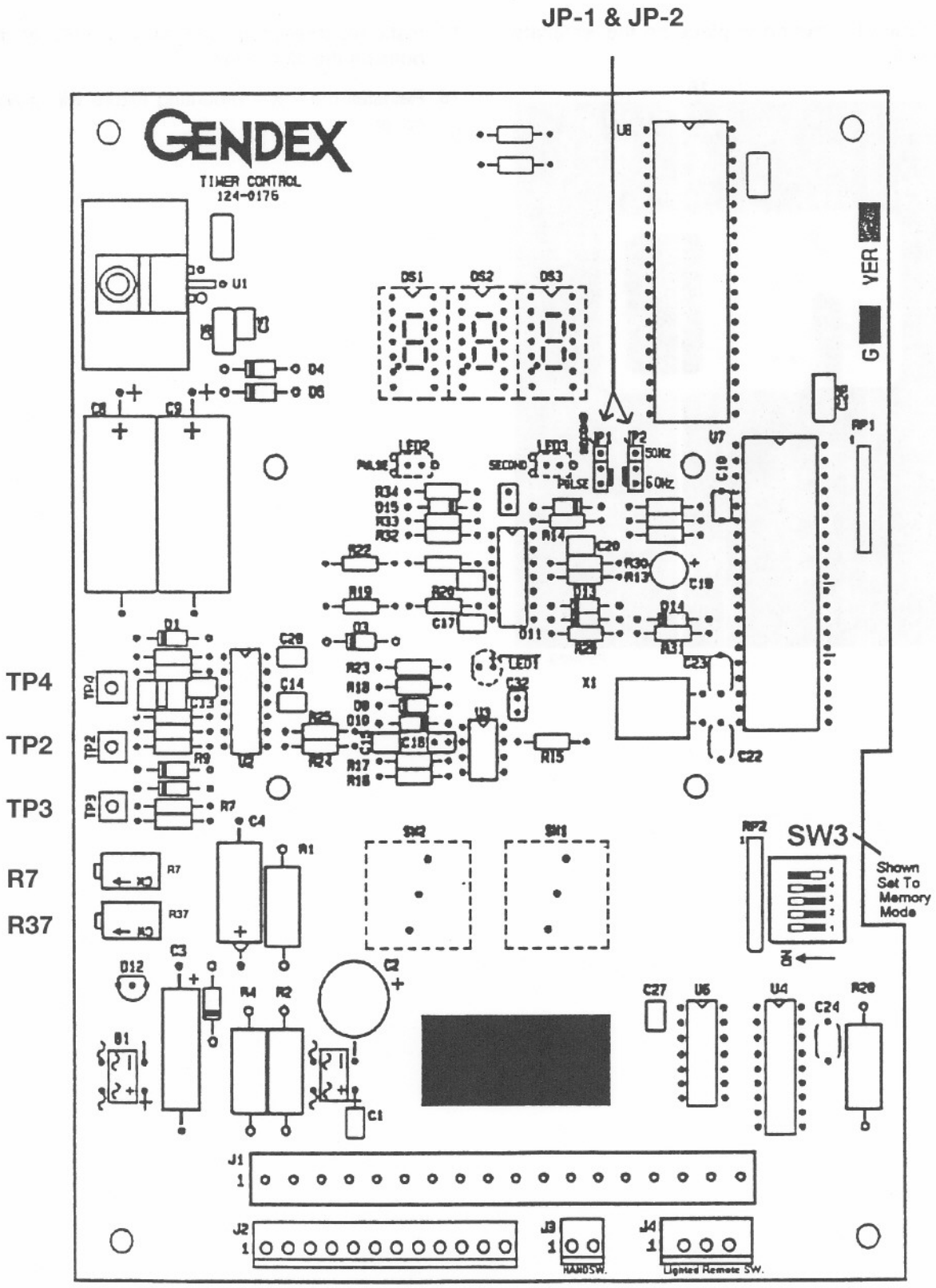


FIGURE 1
TIMER CONTROL BOARD

SECTION 3
ELECTRICAL CALIBRATION

NOTE: FOR EXPORT MODEL, REFER TO THE 230 VAC 50 HZ ADDENDUM.

WARNING

Radiation will be produced numerous times during the electrical calibration. Therefore a lead plug must be placed over the tubehead port. These plugs are available from GENDEX.
Part No. 100108P1.

CAUTION

It is recommended that all of the following measurements be recorded by the installer. A separate sheet titled "Product location/Identification Log and Calibration Record" is provided for this purpose. One copy should be attached to the owner's copy of the form FDA 2579 and the other to the installer's copy.

These calibration procedures must be followed to insure the installation is fully compliant with applicable regulations. If the required measurement values cannot be obtained, contact GENDEX for guidance, and advise the user not to operate the equipment.

INSTRUMENT REQUIREMENTS

The following measuring instruments with required accuracies are needed to insure the GX-770 installation is fully compliant with applicable regulations:

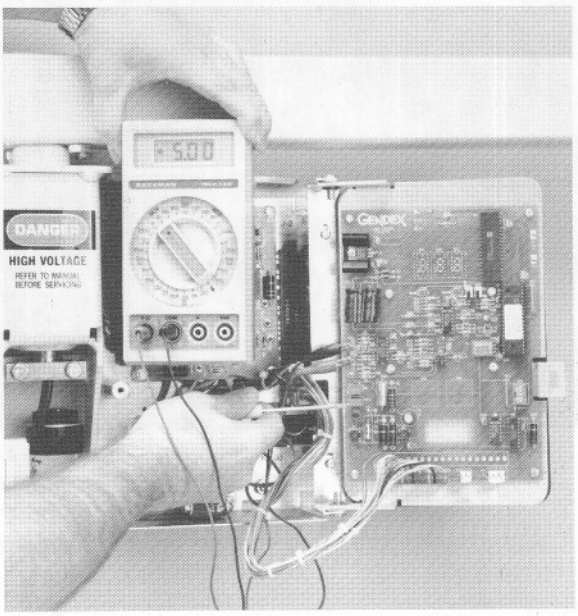
Type of Instrument	Range	Accuracy
AC Voltmeter, Iron Vane or True RMS Digital Meter	0-150 VAC RMS	+/-1.5V
DC Milliameter	0-10 mA DC	+/-0.1mA
DC Voltmeter	0-20V DC	+/-0.02V
Impulse Counter	0-999 Impulses 80-120V RMS 60HZ	+/-0 Impulse

Suggested instruments:
AC/RMS, DC Voltmeter and DC Miliameter:
Fluke model 87, 93, 95, 97, 8030, or 8060
Wavetech model RMS225, 330, 360B, 850, 2020, HD130A, HD140A, or DM2
Impulse Counter compatible with 60-120 VAC

1. Install a lead plug in the tubehead port.
2. Make sure the Master Control is turned off.
3. Plug in the line cord or turn on the power at the distribution panel.

For following steps refer to Timer Control Board. See Figure 1, Page 3-1.

4. Check placement of jumpers JP-1 and JP-2 on the back side of Timer Control Board Jumper JP-1 is used to select impulses or seconds on the timer display. Jumper JP-2 is used to select 50 Hz or 60 Hz operation.
5. With the Master Control turned off, connect a DC Voltmeter between TP-2 (+) and TP-4 (-) on the Timer Control Board.



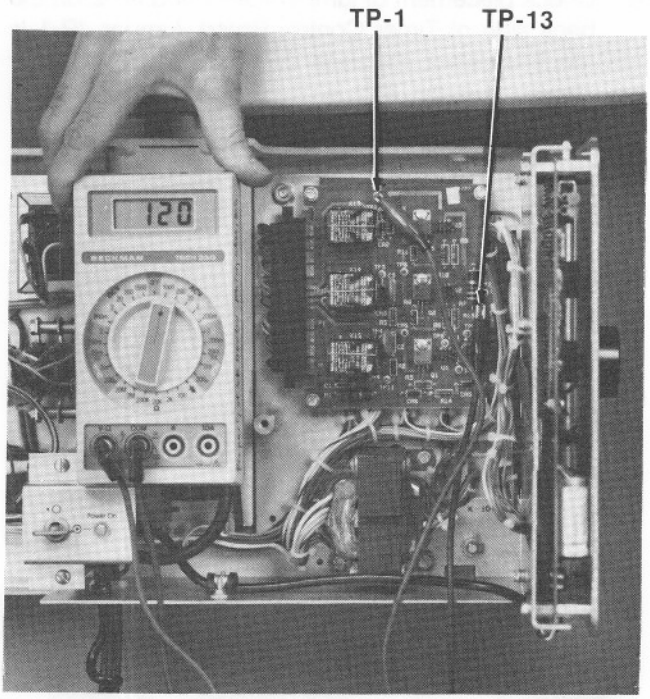
6. Turn on the Master Control. The Voltmeter reading should be 5.00 +/- 0.01 VDC. If not, adjust R-37 on the Timer Control Board to obtain 5.00 VDC. Record the final "Vref" reading on the calibration record.
7. Turn off Master Control and remove meter leads.

8. With the Master Control turned off, place the timer Control Board into calibration mode by placing all the switches on dipswitch bank SW3 to ON position, located on the back side of Timer Control Board, to the ON position. (See Fig. 1 Page 3-1).

Note: With Timer Control Board in Calibration Mode the exposure time will be 198 impulses (3.96 seconds). The timer display will display a 3 digit number used to set line compensation in Step 12.

Alternate Method to Enter Calibration Mode:
CAL-Mode can also be entered by pressing the exposure switch and the "UP" button while turning on the power to the unit. To exit CAL-Mode, press the "DOWN" button or turn off the power to the unit.

9. With the Master Control turned off, connect and AC Voltmeter to read 100 to 130 VAC between TP-1 and TP-13 on the Relay Circuit Board.



F59829-44

10. Turn on the Master Control and note the voltmeter reading. Record the "No-Load" line voltage on the Calibration Record. This voltage must be between 110 and 130 VAC.

11. Make an exposure using the handswitch. Record "Load" voltage on the Calibration Record.

NOTE: The voltage variation, "No-Load" minus "Load" voltage, must not exceed 5 VAC.

12. With Timer Control Board still in Cal-Mode use chart 1 to find the 3 digit number that corresponds closest to the "Load" voltage from step 11. Adjust R-7 to match the 3 digit number from chart 1 with the timer display.

CHART 1

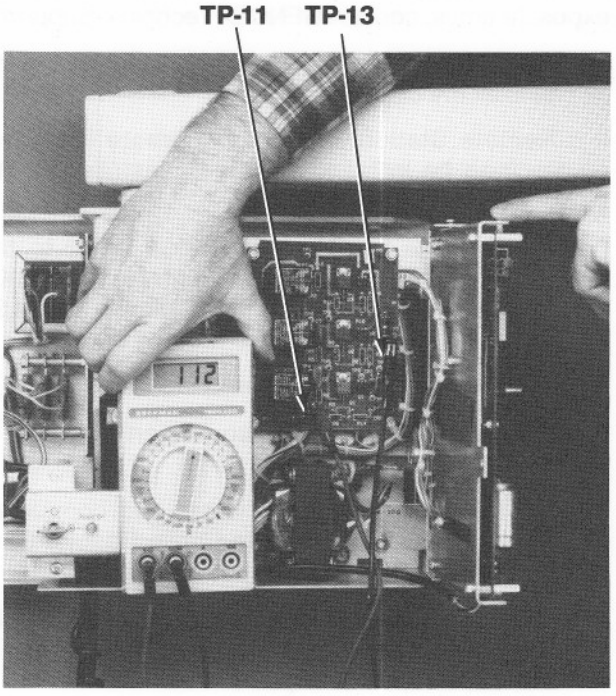
"Load Voltage	A/D Value
< 99.0	E-L
100.0	430
100.7	440
101.4	450
102.1	460
102.8	470
103.6	480
104.3	490
105.0	500
105.8	510
106.5	520
107.2	530
107.9	540
108.6	550
109.4	560
110.1	570
110.8	580
111.6	590
112.2	600
113.0	610
113.7	620
114.4	631
115.2	641
115.9	652
116.6	662
117.3	673
118.0	683
118.8	693
119.5	704
120.2	714
120.9	725
121.6	735
122.4	746
123.1	756
123.8	767
124.5	777
125.2	787
126.0	797
126.7	807
127.4	817
128.1	827
128.8	837
129.5	847
130.3	857
131.0	867
131.7	877
> 132.0	E-H

E-L: Error-Low Line Voltage Input or Vref too low.

E-H: Error-High Line Voltage Input or Vref too high.

13. Turn off Master Control and remove leads.

14. With the Master Control turned off, connect an AC Voltmeter to read 100 to 130 VAC between TP-11 and TP-13 on the Relay Circuit Board.



F59829-23

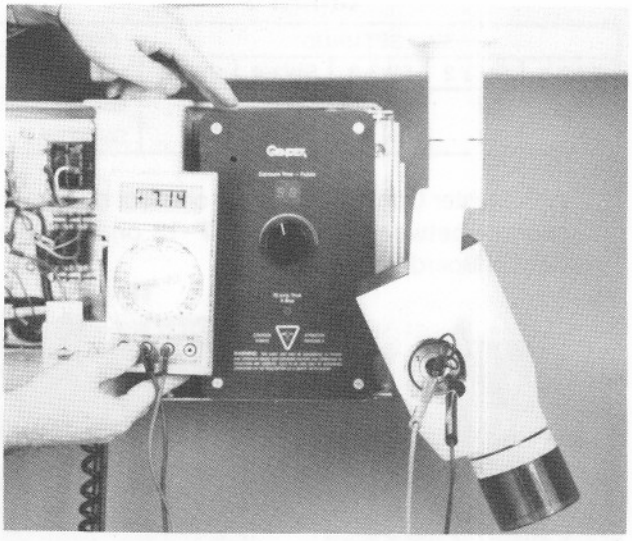
15. Turn on the Master Control and make an exposure using the handswitch. The "regulated voltage between TP-11 and TP13 should be as indicated on Chart 2.

CHART 2

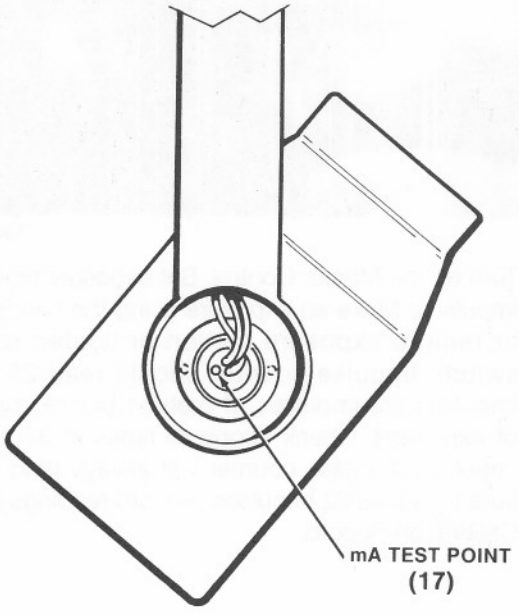
If "No Load" voltage TP-1 to TP-13 is:	TP11 to TP-13 "Regulated" voltage during exposure should be:
110 to 115 VAC	105 to 115 VAC
115 to 130 VAC	109 to 117 VAC

16. Turn off Master Control and remove meter leads. Record final "regulated" voltage on Calibration Record.

17. With the Master Control turned off, remove the tubehead pivot center. Connect a DC mA meter to read 5 to 10 mA between the mA test point (+) and ground (-).



F59829-71



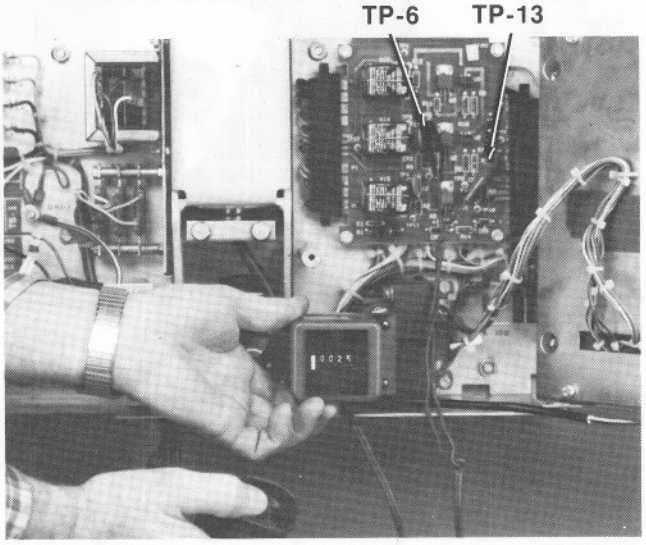
18. Turn on the Master Control. Make an exposure using the handswitch. The mA reading should be 7 +/-1.0mA. If the proper value is not obtained, contact GENDEX Technical Support. Record final reading on the Calibration Record.

19. Turn off the Master Control and remove the Meter leads. At this time, set the dipswitch SW3-5 to OFF for Memory Mode. *Memory Mode will default to the last time setting. Refer to chart 3.*

CHART 3

SW3 SETTINGS					EXPOSURE
SW3-1	SW3-2	SW3-3	SW3-4	SW3-5	
ON	ON	ON	ON	OFF	MEMORY MODE
ON	ON	ON	ON	ON	CAL-MODE

20. With Master Control turned off, connect an impulse counter between TP-6 and TP-13 on the Relay Control Board.



F59829-62

21. Turn on the Master Control. Set exposure time for 3 impulses. Make an exposure using the handswitch or remote exposure station or lighted remote switch. Impulse counter should read 25 +/- 0 impulses (22 impulses of preheat plus 3 impulses of exposure). Check exposure times at 32 and 62 impulses. Impulse counter will alreays read exposure time plus 22 impulses. Record readings on the Calibration Record.

NOTE: If impulse counter reads one impulse higher than calculated, i.e., exposure time set at 3 impulses and impulse counter reads 26, reverse your impulse counter leads. If you are unable to obtain proper exposure times, contact GENDEX Technical Support.

22. Remove the lead plug from the tubehead port and reinstall the cone.

If a Remote Station or Lighted Remote Exposure Switch is to be installed, it may be installed at this time.

For the Remote Station installation, refer to the instructions shipped with each Remote Station Kit. For the installation of the Lighted Switch (D0773LS), refer to the instructions supplied with the switch.

To install a Remote Exposure Switch:

1. Locate the handswitch plug (J3) on the back of the Timer Control Board.
2. Cut the handswitch plug wires, and completely remove the handswitch and coiled cable. Save the handswitch cable clamp.
3. Splice the Remote Exposure Switch wires into the handswitch plug. Secure the wires using the handswitch cable clamp.

To install a Lighted Remote Exposure Switch:

1. Locate the (J4) plug for the Lighted Remote Exposure Switch on the back of the Timer Control Board.
2. Connect the 3 user supplied wires to the 3 pin pigtail harness supplied with the kit. The individual wires are labeled on the pigtail #1, #2, and #3. Mark down the wire colors that were connected to pigtail wires, to insure proper hookup at the lighted switch.
3. Connect the Lighted Switch to the corresponding wire 1, 2, and 3, see notes taken in step 2. Tape or wire nut all connections, make sure none of the connections touches each ground.

NOTE: If the F3 fuse blows after installing the Remote Exposure Switch, the problem is that one of the Remote Exposure Switch wires is *shorted to ground.* Correct the problem before replacing the fuse. **USE ONLY THE PROPER RATED FUSE.**

CAUTION

Use of any switch other than those furnished or recommended by GENDEX could damage the GX-770. In no case should a "lighted" doorbell button be used.

SECTION 4
SYSTEM FUNCTION CHECKS

The following must be performed to complete the installation of the GX-770. These are also to be performed as part of the PERIODIC MAINTENANCE, at 12 month intervals. Failure to perform these checks may result in an installation that does not comply with U.S. Radiation Performance Standards 21 CFR Subchapter J.

IMPORTANT

If the GX-770 System does not perform the functions as follows, see the Troubleshooting Section of this manual or contact GENDEX Technical Support. Advise the owner that the system is NOT TO BE USED.

1. Complete the Electrical Calibration (Section 3) before proceeding.
2. Labels — Insure that all certified components bear labels that include model and serial numbers, date of manufacture, and a statement of certification. This is required on:

   Canadian Master Control ... Model #46-404600G1,G4,G6
   Domestic Master Control ... Model #46-404600G3,G6
   Master Control (50 Hz) ..... Model #46-404600G2,G5
   Tubehead ..... Model #46-404650G1
   Model #46-404650G3
   Tubehead (50 Hz) ..... Model #46-404650G4
   Remote Station ..... Model #46-404725G1,G2
   12 Inch Focal Length Cone ... Model #46-404653G1
   8 Inch Focal Length Cone ... Model #46-404653G2

   The suspension is Model #46-404770G1 and is not required to be certified.
3. Tubehead — Check for oil leaks or other evidence that could indicate internal damage. Replace tubehead if necessary.

3a. Tubehead Rotation (Yoke) - Assure that the tubehead maintains its position around the horizontal axis provided by the yoke while remaining easy to rotate and position. (See mechanical adjustment section).

4. Check that the aluminum filter is in place inside the tubehead port and shows no sign of damage.
5. Cone — Check that the cone is undamaged, properly installed, and that the distance from the surface of the tubehead port to the distal end of the cone is at least 2.5 in. (6.5 cm).
6. Handswitch — Inspect the handswitch housing and coiled cord for damage or wear. Replace if the housing is cracked or the cord is frayed or cracked.
7. Mounting – Be sure the Wall Support, 4 x 4 Mounting Fixture is securely mounted to the wall or other supporting structure.
8. Power Switch – Depress switch to the "OFF" position. Press exposure switch to verify that an exposure cannot be made. Depress switch to the "ON" position and verify that an exposure can be made.
9. Power On Lamp - Depress power switch to the "ON" position. Verify that the Power On Switch Lamp lights. If a Remote Station is connected, verify that the Exposure Time Readout is operating.
10. Indication of Technic Factors — Verify that the "70 kVp -7mA" is legible on the front panel of the Master Control or the Remote Station. Also check the "Warning" statement.
11. Premature Termination — Select an exposure time of 99 impulses. Make an exposure, but release the exposure button before the exposure terminates automatically. The exposure should terminate as soon as the exposure switch is released.
12. Exposure Indicators — Make several additional exposures of less than 30 impulses and verify the operation of the "X-RAY" lamp at the Master Control or the Remote Station. If there is a Remote Station, verify that the audible signal can be heard at the Remote Station location.
13. X-ray Beam Size — Expose several occlusal film packs (taped together) or a panoramic cassette, placed square just at the end of the cone. Process the film and verify that the resulting image is containable in a 2.5 in. (6.5 cm) circle.
14. Suspension — Should extend and retract smoothly and quietly. Should not drift out from the wall or to either side (see Mechanical Adjustment Section).
15. Information for User — After completing all the previous checks, be sure to turn the GX-770 User Manual over to the owner/user.

NOTE: All required information to be furnished to the user is included in the User Manual. Providing the user with the Installation/Maintenance Manual is also recommended.

SECTION 5
CERTIFICATION

CERTIFICATION RESPONSIBILITY

The GX-770 is certified to comply with provisions of the United States Government Radiation Performance Standards when assembled, calibrated and checked according to the instructions given in this publication.

It is therefore the responsibility of the installer to:

1. Assemble the system according to previous Sections.
2. Perform the Electrical Calibration and System Function Checks.
3. Complete and distribute copies of the United States Form FDA 2579 for installations subject to the United States jurisdiction (see example on page 5-2).
4. Maintain the records of equipment location according to the applicable provisions of the United States law. See Product Location/Identification Log and Calibration Record.

PRODUCT LOCATOR CARDS

A preprinted card is furnished with each serialized component, as part of the GENDEX Product Locator System. Each should be completed by the installer and returned to GENDEX.

Product Locator cards are provided for the following serialized GX-770 components:

Component	Model No.	Certified*
Tubehead	46-404650G1	Yes
Tubehead	46-404650G3	Yes
Tubehead (50 Hz)	46-404650G4	Yes
Master Control, Canadian	46-404600G1,G4,G6	Yes
Master Control, Domestic	46-404600G3, G6	Yes
Master Control (50 Hz)	46-404600G2, G5	Yes
Remote Station	46-404725G1, G2	Yes
12 Inch Cone	46-404653G1	Yes
8 Inch Cone	46-404653G2	Yes
Suspension	46-404770G1	No

*Certified components must be listed on the FDA 2579 and/or a separate list must be maintained by the installer. See Product Location/Identification Log and Calibration Record.

GENDEX Corporation
PRODUCT LOCATOR FILE
901 W. OAKTON STREET
DES PLAINES, IL 60018

ICD

LOT	DESCRIPTION	MODEL	SERIAL
8000	GX-770 CONT DOM	46-40460OG6	770-1251265DP

MANUFACTURE DATE: 5-1-96

INSTALLATION

OWNER T.S. GENDEX D.D.S.
ADDRESS 4379 S. HOWELL AVENUE
SUITE 2
CITY MILWAUKEE STATE WI ZIP 53207
TELEPHONE NO. (414) 769-2888
AREA CODE

INSTALLED BY BOB HOOVER DATE 5/16/96
COMPANY #1 TECHNICAL SUPPORT EQUIP CO.
ADDRESS 901 W. OAKTON STREET
CITY DES PLAINES STATE IL ZIP 60018
TELEPHONE NO. (847) 640-4800
AREA CODE

CERTIFICATION FORM

Upon completion of installation, system/function checks and calibration, the certification form (FDA 2579) is to be completed and distributed according to provisions of U.S. Law.

NOTE: Even though the new FDA 2579 form shown below does not request serial and model numbers for all certified components, the installer remains responsible for location data on ALL certified components. See Product Location/Identification Log and Calibration Record.

COMPLETED EXAMPLE

FOR FDA USE ONLY

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION

REPORT OF ASSEMBLY
OF A DIAGNOSTIC X-RAY SYSTEM

Form Approved: OMB No. 0910-0213
Expiration Date: December 31, 1992
See reverse for OMB statement

D 028897

1. EQUIPMENT LOCATION

a. NAME OF HOSPITAL, DOCTOR OR OFFICE WHERE INSTALLED: T.S. GENDEX D.D.S.
b. STREET ADDRESS: 4379 S. HOWELL AVENUE, SUITE 2
c. CITY: MILWAUKEE
d. STATE: WI
e. ZIP CODE: 53207
f. TELEPHONE NUMBER: 414-769-2888

2. ASSEMBLER INFORMATION

a. COMPANY NAME: #1 TECHNICAL SUPPORT EQUIPMENT CO.
b. STREET ADDRESS: 901 W. OAKTON STREET
c. CITY: DES PLAINES
d. STATE: IL
e. ZIP CODE: 60018
f. TELEPHONE NUMBER: 847-640-4800

3. GENERAL INFORMATION

a. THIS REPORT IS FOR ASSEMBLY OF CERTIFIED COMPONENTS WHICH ARE (Check appropriate box(es))
- [X] NEW ASSEMBLY - FULLY CERTIFIED SYSTEM
- [ ] REASSEMBLY - FULLY CERTIFIED SYSTEM
- [ ] REASSEMBLY - MIXED SYSTEM (Both certified and uncertified components)
- [ ] REPLACEMENT COMPONENTS IN AN EXISTING SYSTEM
- [ ] AN ADDITION TO AN EXISTING SYSTEM

b. INTENDED USE(S) (Check Applicable box(es))

[ ] GENERAL PURPOSE RADIOGRAPHY	[ ] PODIATRY	[ ] CT HEAD SCANNER	[ ] DENTAL PANORAMIC
[ ] GENERAL PURPOSE FLUOROSCOPY	[ ] UROLOGY	[ ] CT WHOLE BODY SCANNER	[ ] RADIATION THERAPY SIMULATOR
[ ] TOMOGRAPHY (Other than CT)	[ ] MAMMOGRAPHY	[ ] HEAD - NECK (Medical)	[ ] C - ARM FLUOROSCOPIC
[ ] ANGIOGRAPHY	[ ] CHEST	[X] DENTAL - INTRAORAL	[ ] DIGITAL
	[ ] CHIROPRACTIC	[ ] DENTAL - CEPHALOMETRIC	[ ] OTHER (Specify in comments)

c. THE X-RAY SYSTEM IS (Check one)
- [X] STATIONARY
- [ ] MOBILE

d. THE MASTER CONTROL IS IN ROOM: ROOM 2

e. DATE OF ASSEMBLY: 05 (mo.) | 15 (day) | 96 (yr.)

4. COMPONENT INFORMATION *(If additional space is needed for this section use another form, replacing the preprinted number with this Form Number and complete Items 1, 4, and 5 only)*

a. THE MASTER CONTROL IS
- [X] A NEW INSTALLATION
- [ ] EXISTING (Certified)
- [ ] EXISTING (Non-certified)

b. CONTROL MANUFACTURER: GENDEX
c. CONTROL MODEL NUMBER: 46-404600G6
d. CONTROL SERIAL NUMBER: 770-1251265
e. SYSTEM MODEL NAME (CT Systems Only)

Complete the following information for the certified components listed below which you installed. For beam limiting devices, tables, and CT gantries enter the manufacturer and Model number in the indicated spaces. For other certified components, enter in the appropriate blocks how many of each you installed in this system.

f. SELECTED COMPONENTS

	MANUFACTURER	MODEL NUMBER	DATE MANUFACTURED
BEAM LIMITING DEVICE	GENDEX	46-404653G1*	5/96
BEAM LIMITING DEVICE	GENDEX	46-404653G2**	5/96
TABLES	MANUFACTURER	MODEL NUMBER	DATE MANUFACTURED
TABLES	MANUFACTURER	MODEL NUMBER	DATE MANUFACTURED
CT GANTRY	MANUFACTURER	MODEL NUMBER	DATE MANUFACTURED

g. OTHER CERTIFIED COMPONENTS (Enter number of each installed in appropriate blocks)

[ ] X-RAY CONTROL		[ ] CRADLE	
[ ] HIGH VOLTAGE GENERATOR		[ ] FILM CHANGER	
[ ] VERTICAL CASSETTE HOLDER		[ ] IMAGE INTENSIFIER	
[ ] TUBE HOUSING ASSEMBLY (Medical)		[ ] SPOT FILM DEVICE	
[1] DENTAL TUBE HEAD		[ ] OTHER (Specify)	

5. ASSEMBLER CERTIFICATION

I affirm that all certified components assembled or installed by me for which this report is being made, were adjusted and tested by me according to the instructions provided by the manufacturer(s), were of the type required by the diagnostic x-ray performance standard (21 CFR Part 1020), were not modified to adversely affect performance, and were installed in accordance with provisions of 21 CFR Part 1020. I also affirm that all instruction manuals and other information required by 21 CFR Part 1020 for this assembly have been furnished to the purchaser and within 15 days from the date of assembly, each copy of this report will be distributed as indicated at the bottom of each copy.

a. PRINTED NAME: BOB HOOVER
b. SIGNATURE: Bob Hoover
c. DATE: 5/15/96

6. COMMENTS
* 12 INCH LENGTH CONE
** 8 INCH LENGTH CONE

FORM FDA 2579 (7/92) PREVIOUS EDITION IS OBSOLETE

White Copy - FDA, HFZ-353, 5600 Fishers Lane, Rockville, MD 20857

SECTION 6
FINAL ASSEMBLY

Final assembly of the unit should not take place until the electrical calibration, installation of a Remote Station or Remote Exposure Switch (if used) and the System Function Checks have been completed.

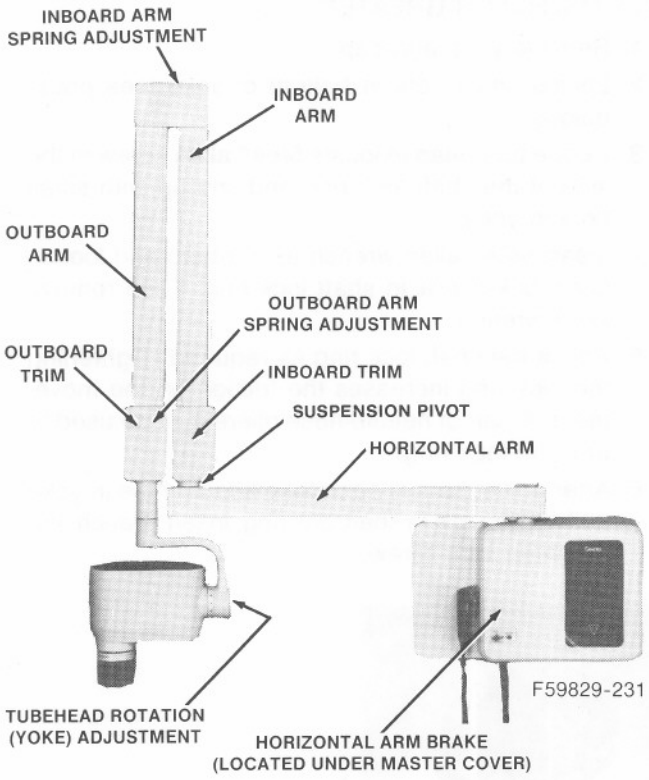
1. Check to insure that the tubehead pivot cover has been reinstalled.
2. Check to insure that all suspension trim covers and plug buttons are installed.
3. Check all wiring terminations including those to a Remote Station or a Remote Exposure Switch for shorts or loose connections.
4. Install the screw to hold the Timer Control Board chassis in place.
5. Install the Master Control cover in place using the four screws removed in Section 2.
6. If a Remote Station is installed, check to insure the assembly is complete and the front cover (bezel) is installed.
7. Be sure the cone is properly installed and the lead plug is removed.
8. Turn the unit "ON" and check for proper operation.

SECTION 7
MECHANICAL ADJUSTMENTS

CAUTION

The positioning of the tubehead and suspension should always be smooth and quiet. If it is difficult or noisy, there might be a mechanical malfunction that could lead to an injury to the patient or operator. If the malfunction cannot be located and corrected, replacement of the suspension is recommended.

GX-770 SUSPENSION



OUTBOARD ARM BALANCE

The outboard arm spring tension and friction adjustments are used to counterbalance the tubehead, trim and cone. Adjustments may be required at installation, after wear due to use or when switching between 8 and 12 inch cones. To check: Bring the inboard arm to the vertical position and move the tubehead through its entire range of vertical travel. The tubehead must maintain position when released. If movement occurs, proceed as follows:

1. If the tubehead has a constant drift, up or down, through its entire range:
   a. Remove the outboard trim covers and the tubehead wiring access cover.
   b. Raise the tubehead until the outboard arm spring assembly adjustment nut can be reached, with the special socket shipped with the arm, through the tubehead wiring access.
   c. Adjust the spring assembly as required. Turn the nut clockwise to increase spring tension.
2. If the tubehead has drift, up or down, but only at isolated places during travel through its range:
   a. Remove the outboard trim covers.
   b. Tighten the friction adjustment screws, one on each side, as required.

INBOARD ARM BALANCE

The inboard arm spring tension and friction adjustments are used to counterbalance the outboard arm, inboard arm, trim, tubehead, and cone. Adjustments may be required at installation, after wear due to use or when switching between 8 and 12 inch cones.

To check: Use the tubehead to move the inboard arm through its entire range of vertical travel. The arm must maintain its position when released. If movement occurs, proceed as follows:

1. If inboard arm has an up or down drift:
   a. Remove the inboard spring adjustment access plug on the top trim.
   b. Raise or lower the inboard arm until the spring assembly adjustment nut can be reached with the special socket shipped with the arm.
   c. Adjust the spring assembly as required. Turn the nut clockwise to increase spring tension.

SUSPENSION PIVOT BRAKE

The suspension pivot friction brake should be set to allow smooth easy pivot of the suspension and yet prevent horizontal drift of the suspension on the horizontal arm. This adjustment along with the horizontal arm pivot brake may also be used to produce a desired sequence of movement between the suspension and the horizontal arm pivot.

NOTE: Neither adjustment is designed to overcome drift created by an "out of level" wall plate.

If adjustment is required:

1. Tighten or loosen the lower set screw on the inside of the pantograph pivot.

HORIZONTAL ARM PIVOT BRAKE

The horizontal arm pivot brake should be set to allow smooth easy pivot of the arm and yet prevent horizontal drift of the arm. This adjustment along with the suspension pivot brake may also be used to produce a desired sequence of movement between the suspension and the horizontal arm pivot.

NOTE: Neither adjustment is designed to overcome drift created by an "out of level" wall plate.

If adjustment is required:

1. Unplug line cord or turn off power at distribution panel.
2. Remove Master Control or 4X4/Special fixture cover.
3. Adjust the horizontal arm pivot brake as required. Adjust both bolts an equal amount to achieve the desired effect.

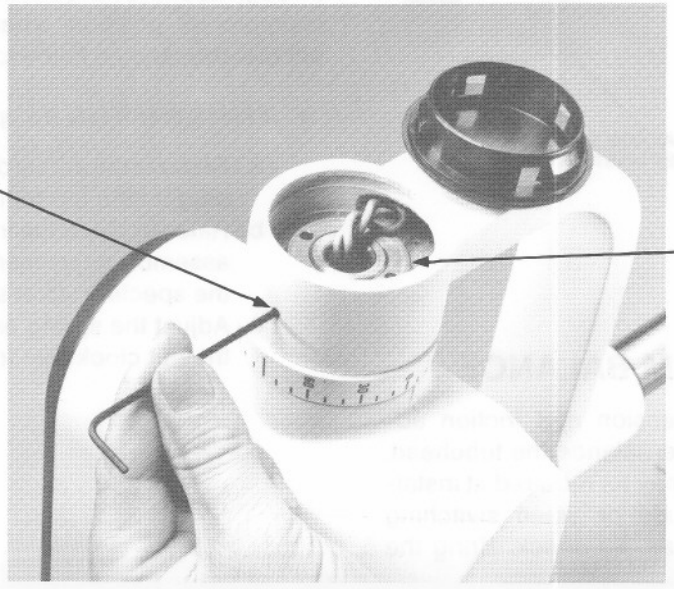
TUBEHEAD ROTATION (in the yoke)

The tubehead rotation adjustment is used to assure that the tubehead maintains its position around the horizontal axis provided by the yoke while remaining easy to rotate and position. Adjustment may be required at installation after wear due to use, or when switching between 8 and 12 inch cones. To check: rotate the tubehead through its 270 degree travel around the yoke axis. It should move freely. Release the tubehead at various positions around its arc. It should maintain its position.

If the tubehead is tight during rotation or will not maintain its position, proceed as follows:

NOTE: THIS IS A NEW PROCEDURE FOR TUBEHEADS STARTING WITH SERIAL NUMBER 771-1152200 OR GREATER.

1. Remove yoke and cap.
2. Locate small hole in bottom of yoke (see photo below).
3. Rotate tubehead to locate 5/64″ allen screw in the side of the shaft lock ring and line up with small hole in yoke.
4. Insert 5/64″ allen wrench as in photo and loosen allen lock screw in shaft lock ring. Then remove allen wrench.
5. Adjust the shaft lock ring as required. Tightening the lock ring increases the friction on the movement. A pair of needle-nose pliers may be used to turn the lock ring.
6. After adjustment is complete, line up hole in yoke and allen screw in shaft lock ring, insert wrench and retighten lock screw.



SECTION 8
REMOTE STATION INSTALLATION INSTRUCTIONS

The A0771AT Remote Station Kit includes:

- 35 ft remote cable with plug
- Terminal strip with stick-on tape
- Grommet
- Insulating jacket
- Remote Control assembly
- Graphic panel cover

NOTE: Electrical connections of the Remote Station should not be attempted until the Electrical Calibration (Section 3) has been completed. Howeved, Steps 1 through 9 may be completed prior to that time.

GENERAL

During installation of the Remote Station, the Timer Control board will be removed from the Master Control and installed in the Remote Station chassis. A graphic panel cover, shipped with the Remote Station kit, will be installed over the original graphic panel.

1. Determine the location of the Remote Station. The unit may be mounted at any height over a range of 48 to 60 inches from the bottom of the remote to the floor. If concealed wiring is used for the remote cable, note the cable entry hole is located 3-3/8 inches from the bottom of the remote wallplate and centered left to right. See Preinstallation Section or the GX-770 template for additional details.
2. If the Remote Station cable is to be concealed, it should be routed at this time.

CAUTION

The remote station cable must not be routed through conduit with 120 volt conductors. A short insulating jacket is supplied to cover the remote cable from the junction box to the handswitch cable clamp in the Master Control.

NOTE: Individual wires on the terminal strip side of the remote cable have been tinned for ease of installation. If it is necessary to cut the cable, do so on the Master Control end.

Total shipping weight of the GX-770 Remote Station is seven pounds.

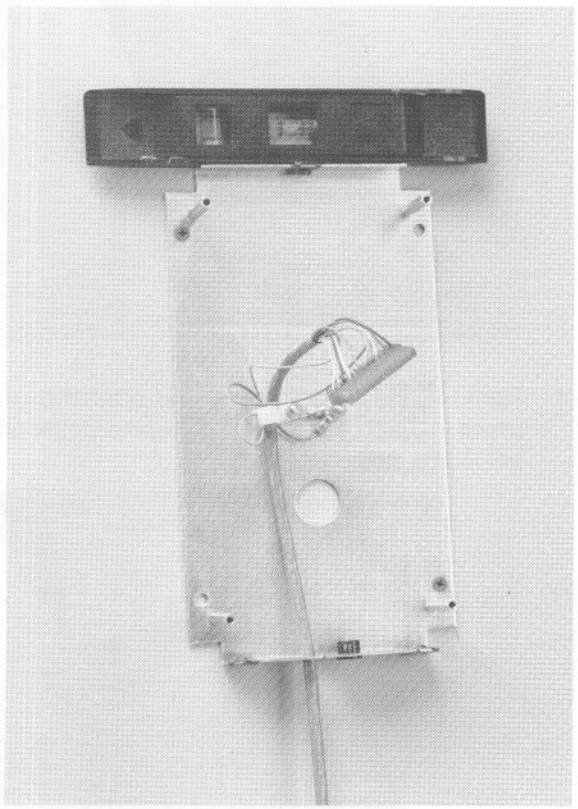
3. Remove the three screws, one on top and two in the bottom, that hold the Remote Station Cover in place. Remove the cover and set aside in a safe place.

4. Remove the four screws that hold the graphic panel in place. Remove the graphic panel and set aside in a safe place.

5. Install the Remote Station wallplate, using the appropriate hardware, with the cable entry hole at the bottom.
6. If the cable is to be surface mounted, it should be routed at this time.

FOR SURFACE MOUNTING OF THE REMOTE CABLE

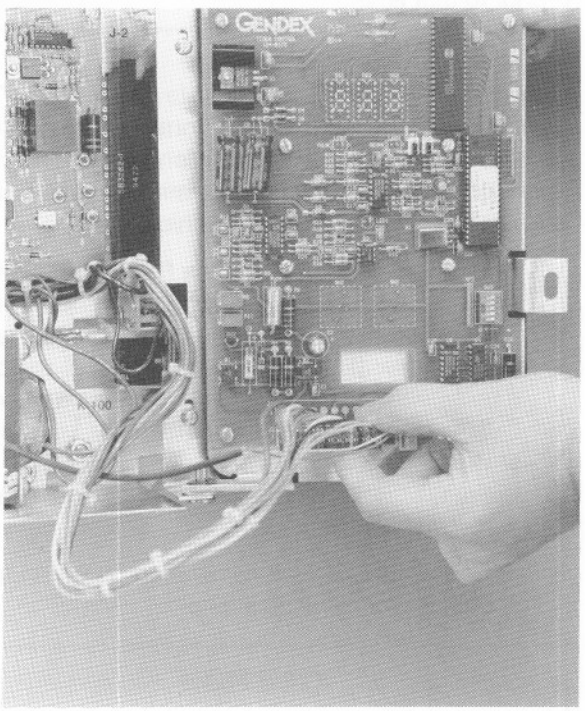
7. Insert the end of the cable to be attached to the remote through the furnished grommet. The large diameter end of the grommet goes into the cable first. Insert the end of the cable through the hole in the bottom of the remote wallplate. Position the grommet so that approximately 11 inches of the cable will be inside the wallplate when the grommet is installed. Snap the grommet in place at this time.



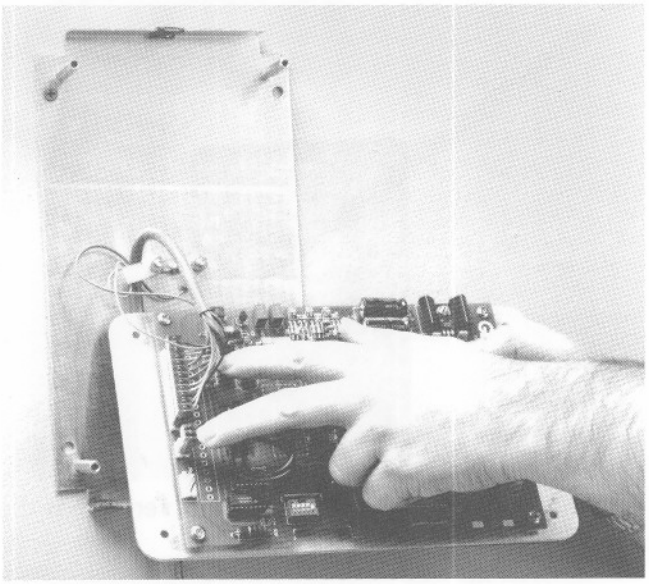
8. Remove the cable clamps from the wallplate. Attach the clamp to the cable and reinstall on the wall plate.

At this time the Electrical Calibration (Section 3) must be completed. *Proceed only after having completed the Electrical Calibration.*

9. Disconnect the two plugs at the bottom of the Timer Control board. Completely remove the handswitch and coiled cord assembly. Save the handswitch cable clamp as it will be used in step 12. Remove the eight screws that secure the Timer Control board. Set the screws aside in a safe place.



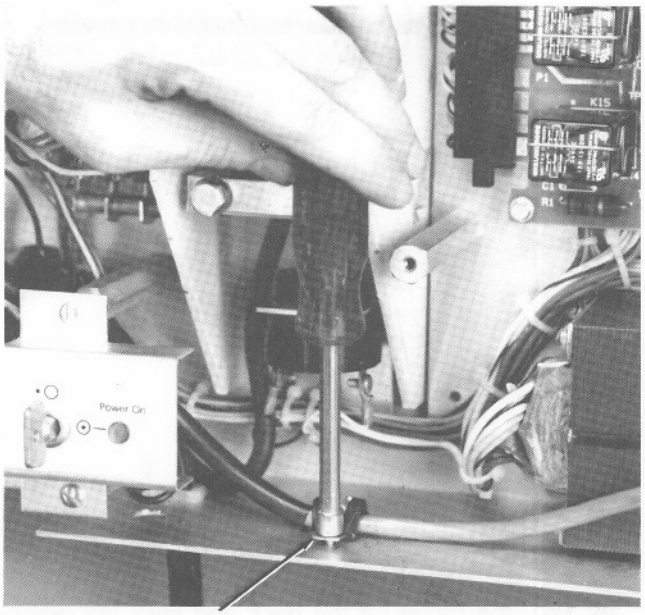
10. Mount the Timer Control board onto the graphic panel of the Remote Station using the eight screws from step 9. Connect the large plug from the remote cable on the bottom of the Timer Control board (J2). Connect the small plug from the exposure switch to the two pin plug (J3).



NOTE: Before mounting the Graphic Panel make sure the SW3 is set for the memory mode. (See Calibration Chart 3.

11. Mount the graphic panel with Timer Control board onto the Remote Station wallplate. Use the four screws that were removed in step 4.

12. Route the remote cable into the Master Control and secure it in place with the handswitch cable clamp.



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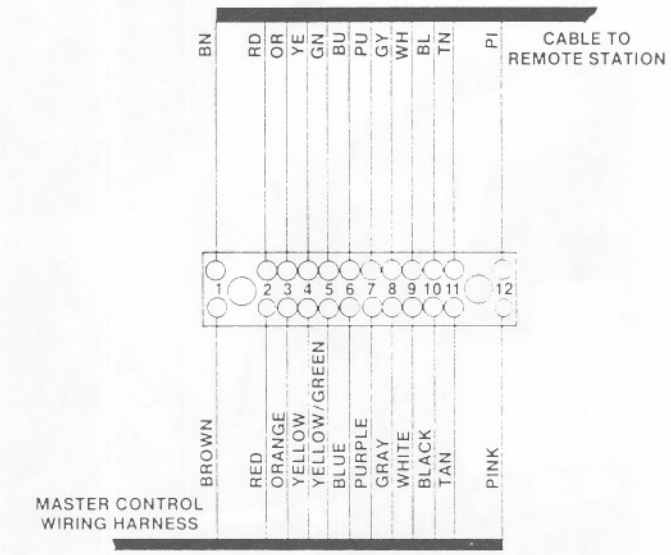
CAUTION

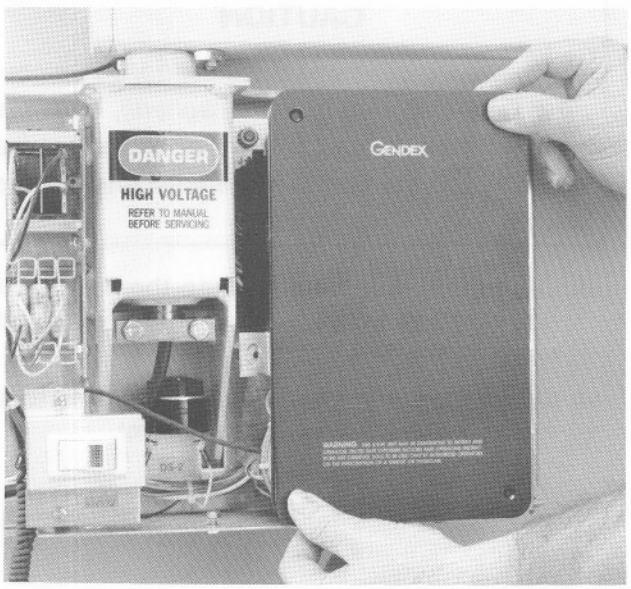
Make sure the cable inside the control box is covered with insulating jacket (spaghetti), from the point it enters the junction box or control via the handswitch opening to the handswitch cable clamp.

13. Center the terminal strip onto the back of the graphic panel in the Master control. Peel off the tape and mount the terminal strip.
14. Cut off the end of the large plug. Strip and tin the wires coming from the Master Control.

15. Connect the Master Control and remote cable wires color for the terminal strip. See the diagram below for the color sequence.



16. Peel the paper off the back and stick the graphic panel cover onto the front of the old graphic panel.



17. Install the Remote Station bezel with the three screws removed in step 3.

18. Turn on the Master Control and verify that the Remote Station functions properly.

Proceed to Sections 4, 5 6 of the GX-770 Installation/ Maintenance Manual for System Function Checks, Certification, and Final Assembly.

Complete Installation I.C.D. Cards and send to Gendex to activate warranty.

SECTION 9
ELECTRICAL TROUBLESHOOTING AND SCHEMATICS

NOTE: FOR EXPORT MODEL, REFER TO THE 230 VAC 50 HZ ADDENDUM.

This troubleshooting guide includes technical data to identify and repair electrical malfunctions.

SIMPLIFIED THEORY OF OPERATION

The following simplified theory of operation briefly discusses the function of the GX-770 components. This information is provided to give the service representative a general understanding of this unique system.

GENERAL

The GX-770 uses an automatic line voltage compensation system to provide a preset voltage to the tubehead primary for maintaining a preset value of 70 kVp. This combined with digital exposure timing and readout, provides consistent density radiographs for a wide range of line voltages.

TIMER CONTROL BOARD

This circuit board contains 1) digital electronics for control of the exposure time display, exposure timing, and required tubehead preheat time. A single switch selected code improves the assurance that the exposure time will be equal to the display time. 2) Automatic line voltage compensation circuitry. This circuitry continuously monitors the incoming line voltage. However, no signal is transmitted to the sequence relays, located on the Relay Circuit Board, until an exposure switch is pressed. This prevents continuous operation of relays K13, K14 and K15 as line voltages change. 3) Exposure start circuitry including preheat delay.

RELAY CIRCUIT BOARD

This circuit board contains 1) automatic line voltage compensation relays, K13, K14, and K15. Signals to operate these relays originate from the Timer Control Board. 2) Preheat start and exposure termination via SCR's Q2 and Q3. 3) Exposure start via Triac Q1.

RELAY K1

K1 provides a backup or safety exposure interrupt in the event of a failure of Q1, Q2 or Q3.

TRANSFORMER, T1

T1 provides the autotransformer requirement needed to assure that a consistant voltage, regardless of line voltage variations prior to pressing the handswitch, is always applied to the tubehead. The various taps are binary coded and switched through K13, K14, and K15 to provide this consistent voltage. T1 input to the Timer Control Board also supplies power to the 24VDC power supply and the input to the line voltage sensing circuits.

TRANSFORMER T2

T2 provides power to the Timer Control Board for the 12VDC and 5VDC power supplies. It also provides the line sync pulses for the timer circuit and also exposure start sequence.

RESISTORS R1, R2, and R3

R1 and R3 in conjunction with SCR's Q2 and Q3 provide the series resistance and load resistance respectively for operation of the tubehead inverse voltage suppression circuit. R2 provides the series resistance required during the 22 impulses of preheat. R2 is shunted by Triac Q1 during exposure time.

EXPOSURE SEQUENCE

1. Turn on Master Control.
   - Ready lamp lights
   - Digital readout lights.
   - 24 VDC present between J2-7(+) and TP-3(-) on Timer Control Board.
   - 12 VDC present across C8 on Timer Control Board.
   - 5 VDC present between the top pin of JP-1(+) and TP-3(-) on Timer Control Board.
2. Press exposure switch.
   - K-100 safety relay pulls in.
   - Relays K13, K14 and K15 on Relay Circuit Board pull in according to incoming line voltage.
   - Preheat SCR's, Q2 and Q3, turn on via TP-7(-) to TP-12(+) on Relay Circuit Board.
   - Reduced voltage applied to tubehead for filament preheat.
   - Begin 22 impulse tubehead preheat period.
3. After 22 impulse tubehead preheat period.
   - Exposure triac, Q1, turns on via TP-8(+) to TP-9(-) on Relay Circuit Board.
   - Timed X-ray exposure begins.
4. After selected exposure time.
   - Q1, Q2 and Q3 on Relay Circuit Board turn off.
   - Input voltage to tubehead goes to 0.
   - Exposure terminates.
5. Release Exposure switch.
   - K100 safety relay drops out.

TROUBLESHOOTING

NOTE: Following all electrical troubleshooting, perform the complete electrical calibration in Section 3.

SYMPTOM: CAN NOT ADJUST EXPOSURE TIME, X-RAY LAMP STAYS ON.

STEP	CONDITION	EXPECTED RESULT	INSTRUCTIONS
1A	Power disconnected.		Replace F3 fuse. Go to 2A.
2A	Control on.	F3 fails?	Yes: Go to 3A. No: Go to 2B.
2B	Press Exposure Switch	F3 fails?	Yes: Go to 3A. No: Check for X-ray. If no X-ray, go to **SYMPTOM: NO-XRAY**
3A	Unplug Exposure Switch Control on.	F3 fails?	Yes: Replace TCB**. No: Go to 3B.
3B	Short J-3 pins together.	F3 fails?	Yes: Check K100 or CR1 on RCB*. No: Check for X-ray and repair short in Remote switch wiring.

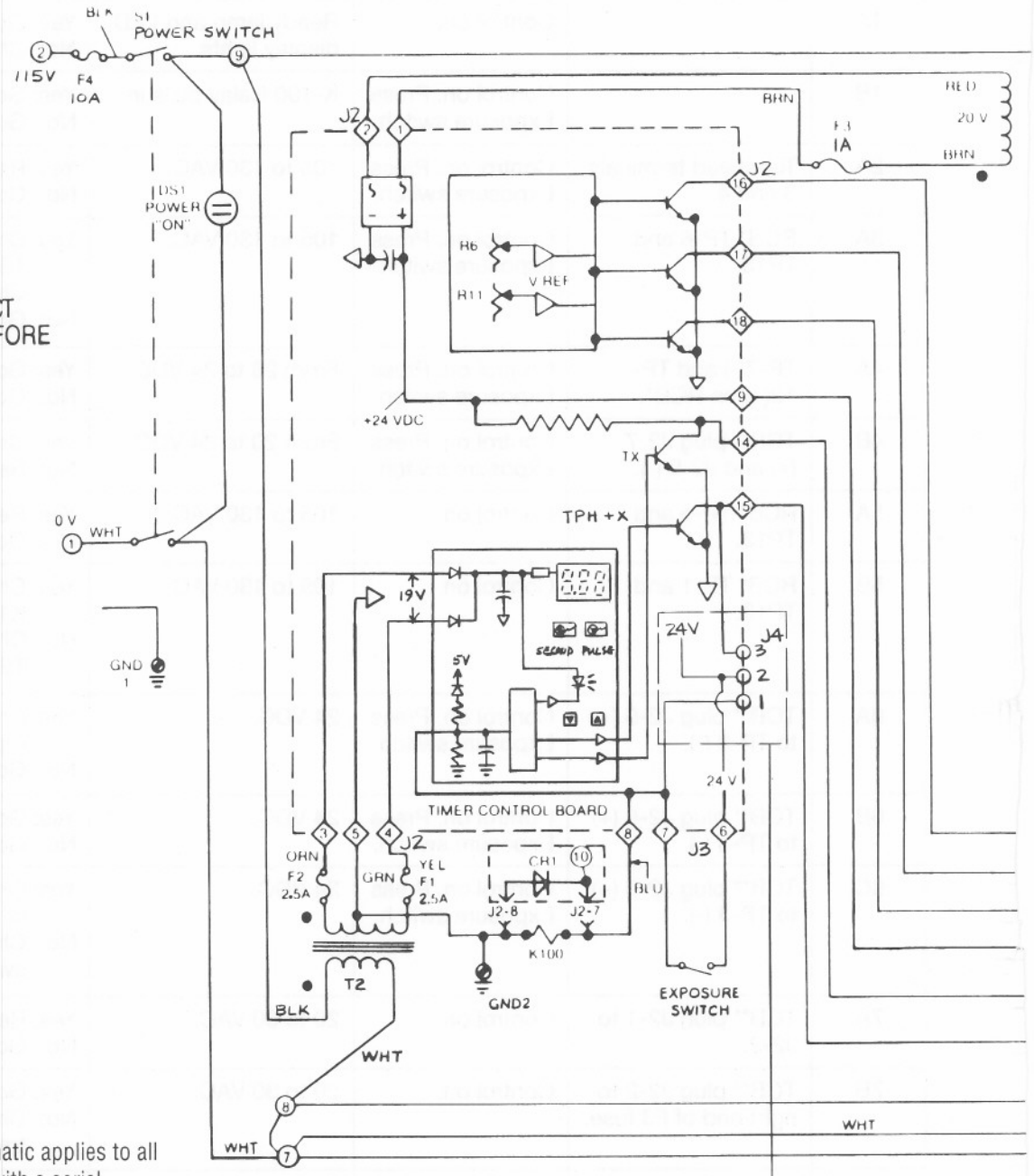
RCB* : Relay Control Board (P/N 46-404876G2).
TCB**: Timer Control Board (P/N 124-0178G1).

SYMPTOM: NO X-RAY, CANNOT BE SEEN ON A FLUORESCENT SCREEN.

Set exposure time to 99 pulses or 1.98 sec.

STEP	TEST POINT	CONDITION	EXPECTED RESULT	INSTRUCTION
1A		Control on.	Ready lamp and LED display lights.	Yes: Go to step 1B. No: Check F4 fuse.
1B		Control on. Press Exposure switch.	K-100 Relay pulls in.	Yes: Go to step 2A. No: Go to step 6A.
2A	Tubehead terminals 3 and 4	Control on. Press Exposure switch.	105 to 130 VAC.	Yes: Replace tubehead. No: Go to step 3A.
3A	RCB* TP-6 and TP13.	Control on. Press Exposure switch.	105 to 130 VAC.	Yes: Check wiring to TS-3 and TS-4 and suspension cable. Check K-100. No: Go to Step 4A.
4A	TP-7(-) and TP-12(+) on RCB*.	Control on. Press Exposure switch.	From 20 to 24 VDC.	Yes: Go to Step 5A. No: Go to Step 4B.
4B	TCB** plug J2-7 (+) and J2-9 (-).	Control on. Press Exposure switch.	From 20 to 24 VDC.	Yes: Check wiring harness. No: Replace TCB**.
5A	RCB* TP-5 and TP13.	Control on.	105 to 130 VAC.	Yes: Replace RCB*. No: Go to Step 5B.
5B	RCB* TP-1 and TP13.	Control on.	105 to 130 VAC.	Yes: Check or replace K13, K14, K15, or replace RCB*. No: Check wiring TP-1 to TS1-9, TP-13 to TS1-8.
6A	TCB** plug J2-6 (+) to TP-3 (-).	Control on. Press Exposure switch.	24 VDC.	Yes: Check K100 wiring or replace K100. No: Go to Step 6B.
6B	TCB** plug J2-6 (+) to TP-3 (-).	Control on. Press Exposure switch.	24 VDC.	Yes: Go to Step 6C. No: Go to Step 7A.
6C	TCB** plug J2-6 (+) to TP-3 (-).	Control on. Press Exposure switch.	24 VDC.	Yes: Check TCB** foil runs or replace TCB**. No: Check or replace Exposure switch.
7A	TCB** plug J2-1 to J2-2.	Control on.	20 to 30 VAC.	Yes: Replace TCB**. No: Go to Step 7B.
7B	TCB** plug J2-2 to right end of F3 fuse.	Control on.	20 to 30 VAC.	Yes: Go to Step 7C. No: Check or replace T1 transformer.
7C	TCB** plug J2-2 to left end of F3 fuse.	Control on.	20 to 30 VAC.	Yes: Check wiring between F3 and TCB** J2-1. No: Replace F3 fuse.

RCB* : Relay Control Board (P/N 46-404876G1).
TCB**: Timer Control Board (P/N 124-0178G1).



"CAUTION"
F4 AT LINE VOLTAGE.
DISCONNECT POWER BEFORE SERVICING FUSES.

Schematic applies to all units with a serial number of 770-1251265 or greater.

J4 TO BE USED ONLY WITH D0773LS

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